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CATALOG A

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APPARATUS

FOR

AGRICULTURE  
AND  
BIOLOGY

MANUFACTURED AND SOLD BY THE  
CENTRAL SCIENTIFIC COMPANY  
CHICAGO, U.S.A.

JAN 6 1922



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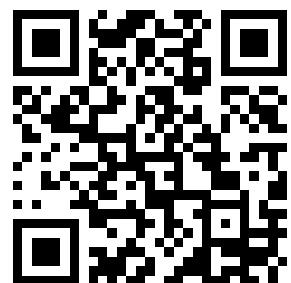
"At the head of all the sciences and arts, at the head of civilization and progress, stands—not militarism, the science that kills, not commerce, the art that accumulates wealth—but AGRICULTURE, the mother of all industry, and the maintainer of human life."—Garfield.

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LABORATORY APPARATUS  
FOR  
*Agriculture and Biology*  
MADE IN AMERICA

CATALOG A

No. 119

UNIVERSITY OF ILLINOIS LIBRARY

JAN 6 1922

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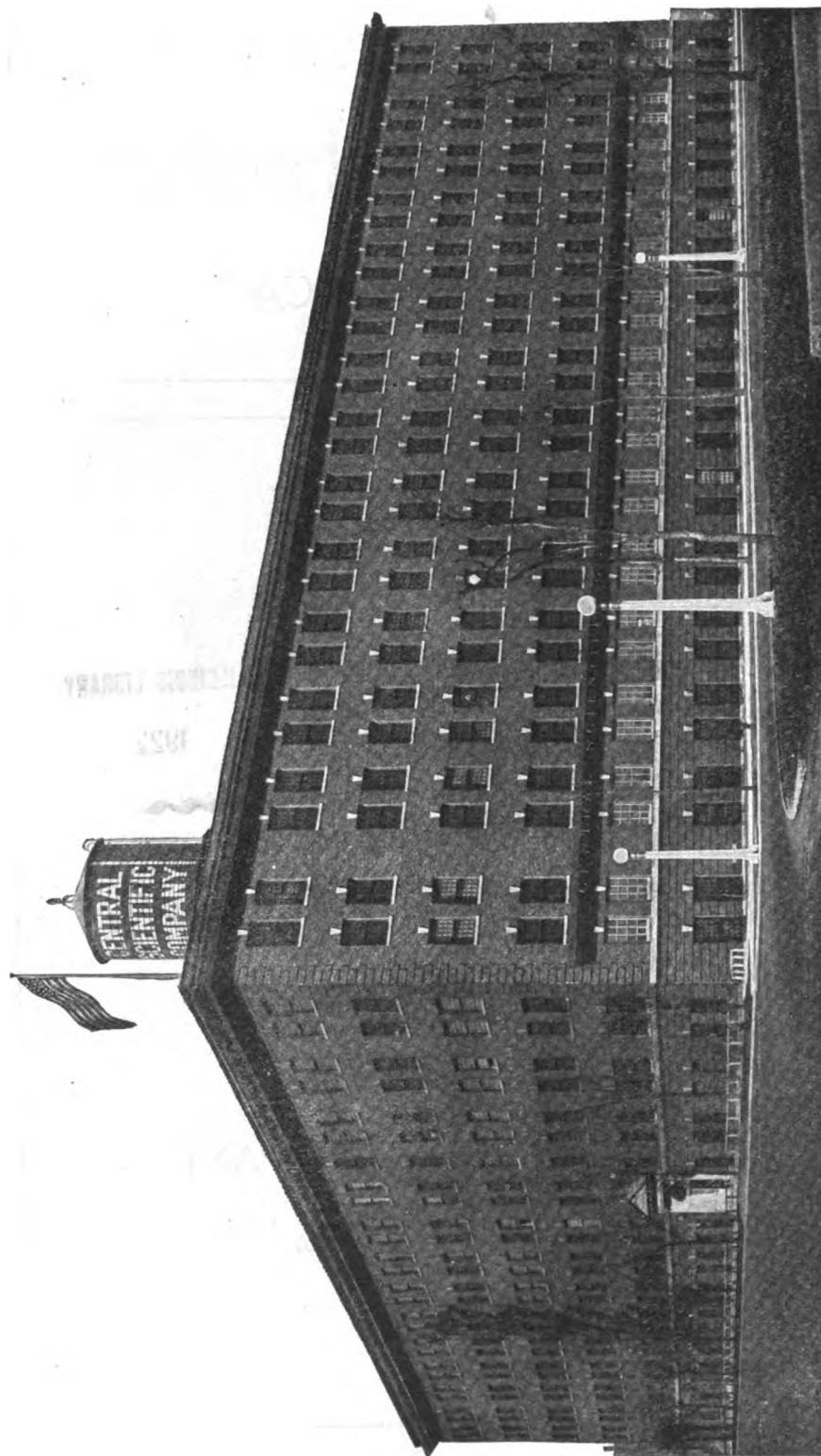
MANUFACTURED AND SOLD BY

CENTRAL SCIENTIFIC COMPANY

460 East Ohio Street  
(Lake Shore Drive, Ohio and Ontario Streets)

CHICAGO  
U. S. A.

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## OUR NEW LOCATION.

Our new location, on Chicago's famous Lake Shore Drive, extending from Ohio to Ontario Street, is a well-lighted, modern, up-to-date six-story building, admirably adapted to our needs. Its 146,000 square feet of floor space afford us ample room for our manufacturing facilities as well as for our large and complete stock of scientific equipment.

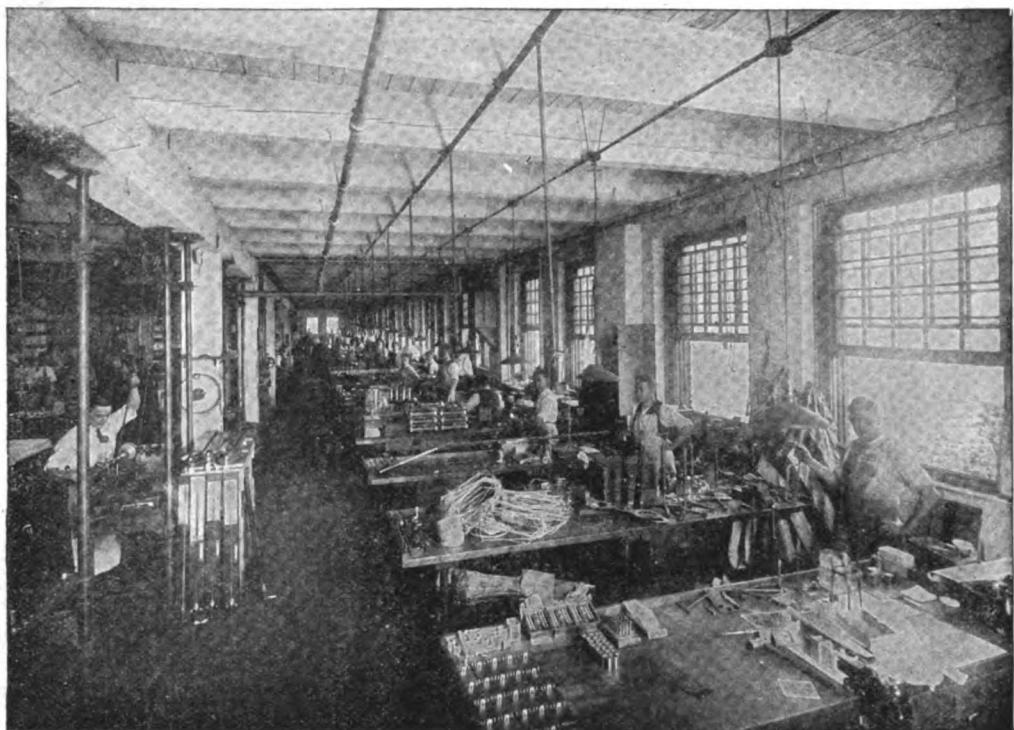
COME AND VISIT US WHEN IN THE CITY.



The Central Corridor of Our Spacious and Well Lighted Offices.



A Corner of Our Display Room.

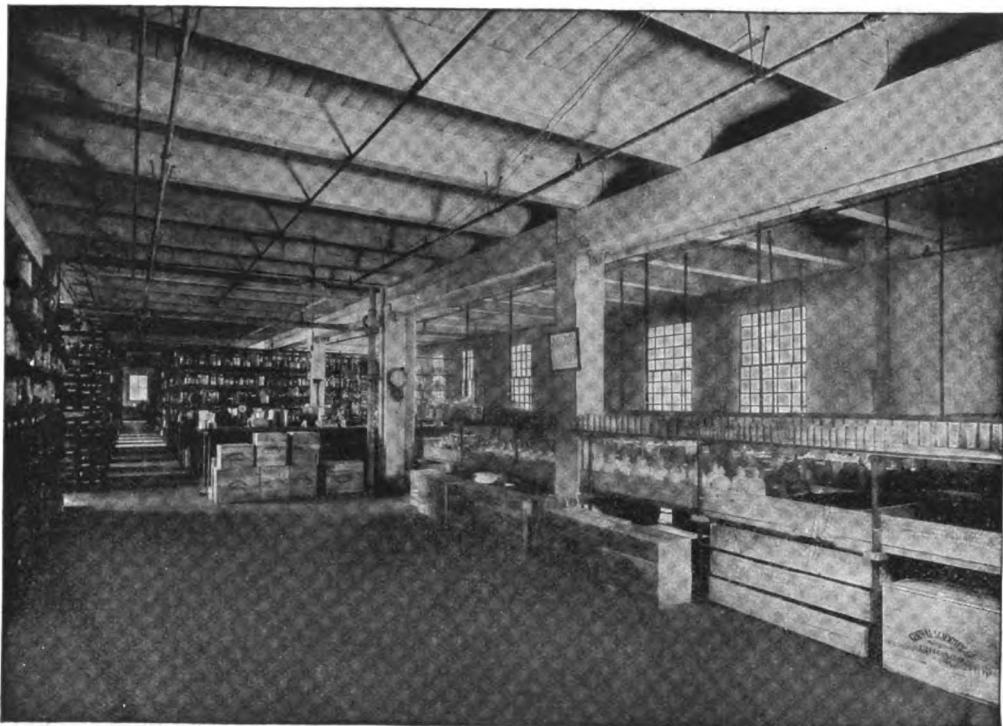


**Looking Down the Central Aisle of Our Instrument Shop.**

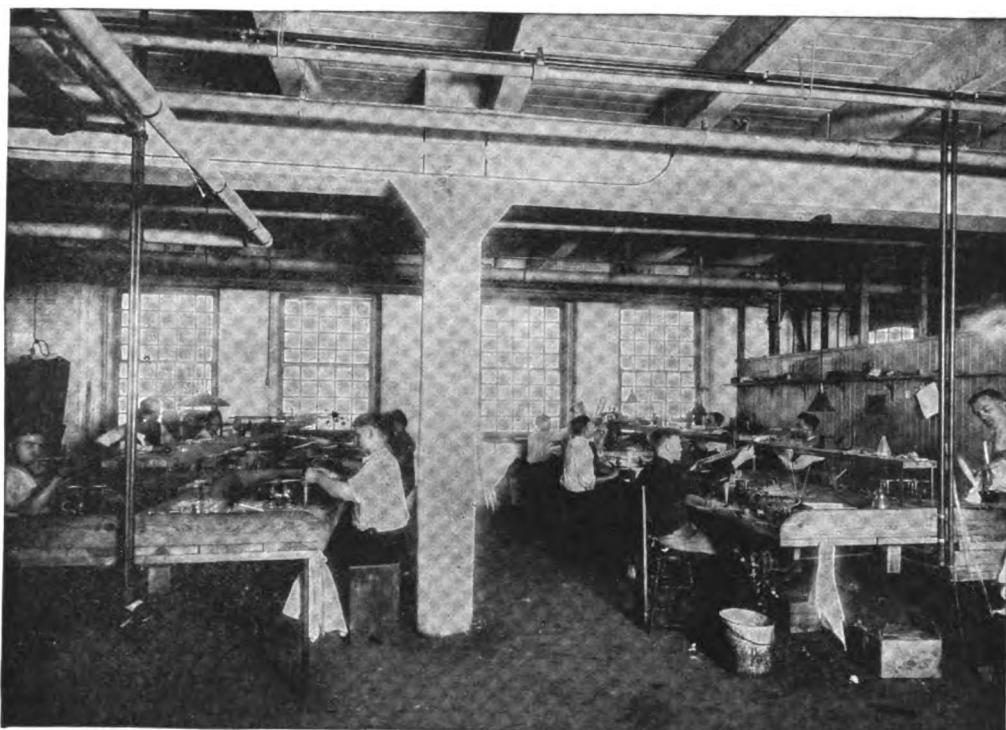


**Our Heavy Duty Machinery Room.**

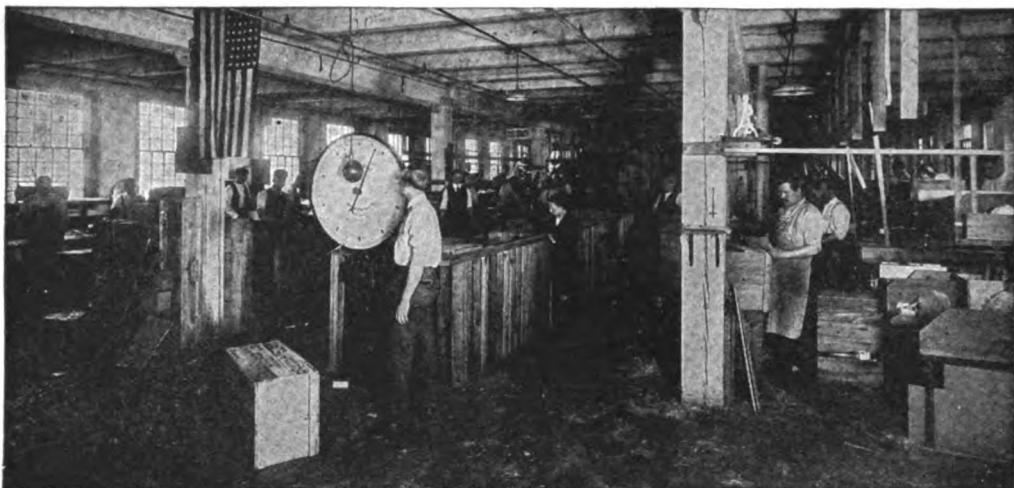
CENTRAL SCIENTIFIC CO., CHICAGO, U. S. A.



Our Chemical Stock and Packing Room.



One Corner of Our Glass Shop, which Includes in Addition to the Lamp Room (shown here) a Graduating and Grinding Room, an Acid Room, an Annealing Furnace, a Stock and Preparation Room and a Business Office.



A View of Our Shipping Room.



One Section of Stock Bins Showing How Goods are Stored When Taken Out of the Original Cases. Over 40,000 Square Feet of Floor Space are Occupied by Our Stock of Scientific Apparatus.



One Section of Our Reserve Stock.

## TO SCIENCE TEACHERS

We take great pleasure in presenting this first edition of our Combined Catalog A of Agricultural and Biological Apparatus. Those who are familiar with the former editions of these two catalogs will find that many changes have been made, both in the form of the catalog, and in the many additions to our line of apparatus.

The close relations existing between the subjects of Agriculture and Biology, the ever-increasing tendency toward placing the emphasis on the application of pure science to industry, and the extent to which the experimental work in these two subjects overlaps, have induced us to issue these catalogs in combined form.

### FORMER EDITIONS.

The Central Scientific Company was the first Laboratory Supply House to issue a catalog of Agricultural Apparatus for Schools, known as Catalog X. Our first edition was issued in June, 1910, and was followed by enlarged and revised editions in September, 1911; February, 1914; September, 1914; and June, 1915. The last edition mentioned has for several years been considered a standard reference book of apparatus for Agriculture in the High Schools and Agricultural Colleges of the country, and has been extensively copied by other Laboratory Supply Houses.

The first edition of Catalog N of Biological Apparatus was issued in 1904 and has been revised and enlarged from time to time.

All copies of Catalogs N and X should be destroyed in order to prevent confusion of numbers in making out lists, as all of the former catalog numbers have been changed in the new catalog.

Catalog A is supplementary to our complete Catalog C, in which is listed a complete line of apparatus required for laboratory work in Bacteriology, Biology, Chemistry, Pathology, Physiology and Soil Analysis. This complete catalog will be sent free of charge on request to Board of Health, Hospital and Clinical Laboratories; to Departments of Bacteriology, Biology, Chemistry, Pathology, Physiology and Soil Analysis, in Colleges and Universities; and to Industrial Laboratories.

### NEW DESIGNS.

As the pioneer in the field of Agricultural Apparatus, we have been gratified with the success achieved and have endeavored to keep pace with the trend of Agriculture teaching throughout the country, both in modifying existing forms of apparatus and in adding new designs in accordance with the demand.

### CO-OPERATION WITH AUTHORITIES.

In the design and manufacture of apparatus for the Agricultural Class Room and Laboratory, we have had the benefit of the advice, suggestions, and assistance of the U. S. Department of Agriculture (Bureau of Soils), Washington, D. C., and of many prominent agriculturists in such institutions as the Iowa State College of Agriculture and Mechanic Arts, and the Colleges of Agriculture of the University of California, Cornell University, University of Illinois, University of Minnesota, University of Missouri, University of Nebraska, University of North Dakota, Ohio State University, Purdue University, University of Wisconsin and others.

### THE SMITH-HUGHES ACT.

From the beginning, we have been in touch with the State Directors of Agricultural Education appointed for the administration of the provisions of the Smith-Hughes Act in the various states, and are constantly studying the administration of this law throughout the entire country. As a result of this study, we are prepared to furnish lists of apparatus required or recommended by the Directors of the different states, which are intended to meet local needs.

In addition, we shall be pleased to extend any other aid in the selection of laboratory equipment for Agriculture or Biology, in furnishing lists for various text-books, in making selections of equipment to meet limited appropriations, etc.

### SERVICE.

We have in our sales force a number of men who have specialized in the field of science, several of whom were teachers of years of experience in High School or College work. We shall be pleased at any time to have you lay your problems before us, feeling confident of our ability to render you intelligent and useful service. No special department need be designated in such cases, as our entire organization is founded on the principle of service to the customer.

### ARRANGEMENT OF ITEMS.

In compiling this catalog, we have arranged the materials listed in alphabetical order both by sections and by items, as our experience in the past has convinced us that this arrangement makes the location of items easier for one unfamiliar with the catalog.

## IMPORTANT! READ CAREFULLY!

We are desirous of avoiding mistakes and misunderstandings in our dealings and, therefore, make the following suggestions, the careful observance of which will be to our mutual advantage.

### **FORMER EDITIONS.**

Former editions, if used, will cause you and us much inconvenience and possible annoyance, to avoid which we ask you to destroy all former editions of our Catalogs X and N.

### **CORRESPONDENCE.**

Correspondence should plainly indicate State, Town, name of School and should be officially signed.

### **CHANGES IN DESIGN.**

In order to keep pace with the advancement of Science and improved laboratory methods, we often find it necessary to alter the details of construction of apparatus from catalog illustration. Where such modification does not meet the approval of the purchaser, he is at liberty to return the apparatus.

### **SUGGESTIONS.**

Suggestions regarding improvements in our apparatus and the making of new and useful instruments are desired at all times.

### **PRICES.**

The prices in this catalog were current at the time of publication. Owing to the rapid changes in the cost of raw materials and of labor, we cannot guarantee prices to remain constant for any length of time. We shall be glad to fill orders at prices current at the time of their receipt. If necessary to have the exact cost of materials, we urge our customers to send in their lists for quotation.

### **ORDERS AND LISTS FOR QUOTATION.**

1. When possible, specify our catalog number, name of article and dimensions. Further specification is not necessary. We furnish conveniently ruled order sheets upon request.

**Note:** Lists made from catalogs of other dealers will be transposed by us into our own numbers when possible, with our guarantee that the articles will equal in efficiency and finish those originally specified.

2. Specify date when shipment is desired, with route and method of shipment, i. e., parcel post, express or freight.

### **BOXING.**

**No Charge for Boxing and Cartage** except on orders of \$10.00 or less; then a nominal charge will be made if the boxing exceeds five per cent of the value of the shipment. Prices are F. O. B. Chicago, unless otherwise specified.

### **TERMS.**

Terms are net, thirty days after delivery. Orders from parties unknown to us should be accompanied by remittance or by satisfactory business references.

**Note:** Unless otherwise directed, invoices and statements will be mailed to the person placing the order, upon whom we rely to **O. K.** the Bills Promptly and thus **Expedite Payment**.

### **REMITTANCES.**

Remittances should be in exchange at par in Chicago, as we are obliged to pay exchange upon all private checks, except from a few of the largest cities.

**NOTE.**—School warrants tendered as payment, the funds for which are not immediately available, should, if possible, be registered before sending.

### **SHIPMENTS.**

Unless otherwise ordered, shipments are made by us **At Once**, by such routes as will insure earliest delivery. Large shipments are made by freight and smaller shipments by express or parcel post, as seems expedient to us.

### **CLAIMS FOR BREAKAGE.**

We employ only experienced packers and guarantee our goods to be in first class condition when delivered to the carrier. Our responsibility ceases at that point, and all claims for damage or breakage must be made upon the carrier responsible for their safe delivery. We shall be glad to aid in any way possible in the prosecution of such claims and the recovery of damages.

### **ORIGINAL CASES.**

We especially recommend that our customers take advantage of quantity purchases. American manufacturers of glassware and porcelain have made it possible to secure these commodities in **original case lots at wholesale prices**.

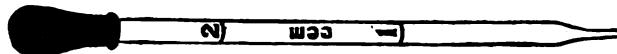
### **RETURNED GOODS.**

In order to avoid the delays incident to the identification of returned goods, we respectfully insist that no articles be sent in without first notifying us as to the reason for their return and the disposition to be made of them. Frequently adjustments can be made without the necessity of returning the goods. If after consideration it appears necessary that the goods be returned, we shall send suitable shipping tags which will insure prompt attention upon their receipt.

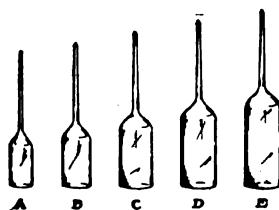
### **NOTICE TO THE TRADE.**

Special notice is given to the trade that this catalog is copyrighted, and that unauthorized reproduction of new cuts or illustrations therefrom constitutes actionable infringement of our rights. We shall use every legal means to protect our work and property.

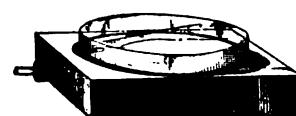
**CENTRAL SCIENTIFIC COMPANY.**



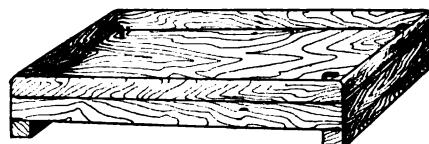
No. 146.



Nos. 162-4.



No. 168.



No. 186.



No. 196.

102. **ABSORBENT COTTON**, best quality.

Size of package, ounces.....	1	4	8	16
Each .....	\$0.12	.22	.45	.85

146. **AIR TESTER**, Wolpert's (Carbacidometer), for obtaining the amount of carbonic acid gas in a room by direct readings from the graduations etched on the glass, thus doing away with all computations and tables as in the old forms. Another advantage of this form is that the air of a room may be secretly tested, if desired. Directions and full set of capsules for making test solutions furnished with each instrument ..... 4.00

147. **EXTRA CAPSULES** for No. 146. In boxes of 12 capsules (six of each reagent)....Per box 1.00

162. **AMPOULES**, of clear resistance glass, with flat bottom.

No. ....	A	B	C	D	E	F	G	H	J	K
Capacity, cc..	1	2	3	4	5	6	7	8	9	10
Per 100 .....	1.80	1.80	2.25	2.25	2.75	2.75	2.85	2.85	3.30	3.30

164. **AMPOULES**, same as No. 162, but of amber glass.

No. ....	A	B	C	D	E	F	G	H	J	K
Capacity, cc..	1	2	3	4	5	6	7	8	9	10
Per 100 .....	1.80	1.80	2.25	2.25	2.75	2.75	2.85	2.85	3.30	3.30

168. **ANAEROBIC CULTURE APPARATUS**, designed by H. M. Jones, of the United States Department of Agriculture. Consists of an Alberene stone base 2 cm thick and 12 cm square, with an annular groove to receive an inverted 100 mm Petri dish. The base is provided with outlet tubes so that gas and pyrogallate methods may be used. The groove may be sealed with paraffine or other wax. The small amount of air enclosed, about 20 cc, permits rapid results to be secured, which are readily visible. (See Journal of Bacteriology, Vol. I, No. 3, for May 1916, page 339)..... 1.50

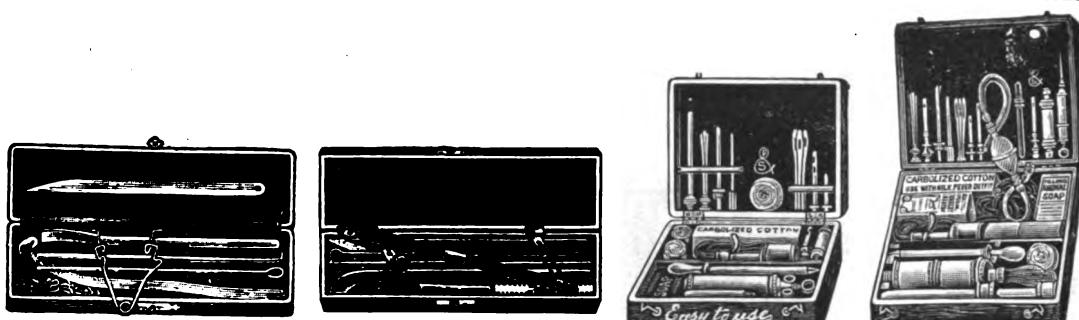
186. **ANIMAL BOARDS**, of wood, with hook in each corner, for use in animal experiments. Small size suitable for guinea pigs and rats; large size for cats and small dogs.

No. .....	A	B
Length, mm.....	320	650
Width, mm.....	200	300
Each .....	3.25	3.50

196. **ANIMAL CAGE**, Mouse Jar, of glass, 5 inches in diameter by 7 inches high, with wire gauze top loaded with a heavy cast iron knob..... 2.00

8042C. **GLASS JAR** only of No. 196, 5 x 7 inches..... 1.05

For **INSECT CAGES**, see Nos. 8000 and 8004.



No. A204.

No. A206.

No. A212.

No. A214.

## ANIMAL HUSBANDRY

A204. **CAPONIZING SET.** Includes Cords, Knife, Spring Spreader, Hook, Probe, Caponizing Canula and Curved Spoon Forceps. Complete with instructions, in a velvet lined case..... \$2.75

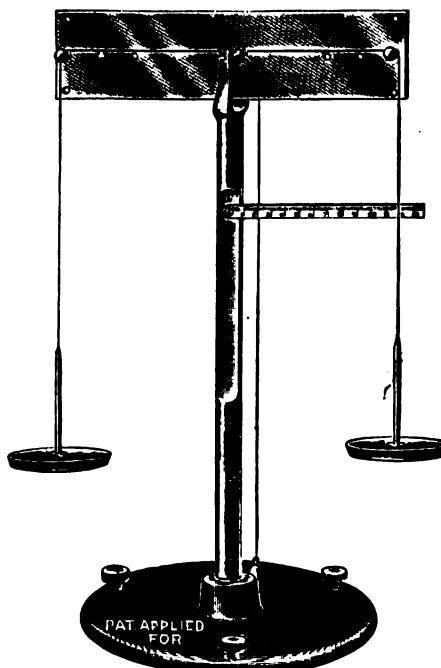
A206. **CAPONIZING SET.** Similar to No. A204, but with a Special Testicle Remover in place of the Caponizing Canula, and an improved Spreader. Complete with directions in an oak case 3.00

A212. **CATTLE INSTRUMENT CASE.** Polished oak case containing the following instruments and supplies: Milk Fever Outfit, Dose Syringe, Trocar for Bloat, 3 Lead Probes, 2 Milk Tubes, Teat Dilator, Teat Slitter (or Bistoury), Teat Opener, Fever Thermometer, Cake of Animal Soap, and two Bandages. With directions for use ..... 11.00

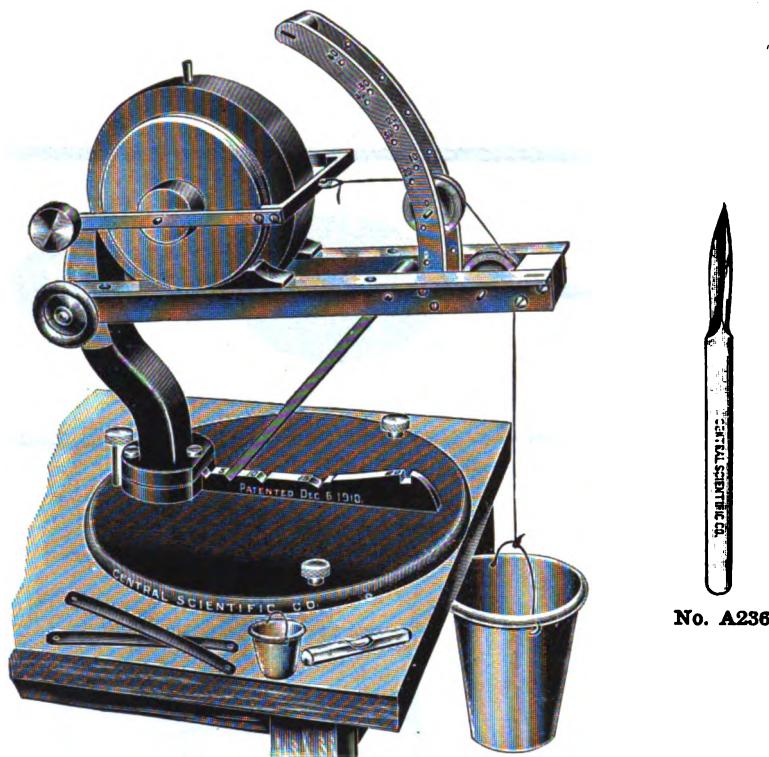
A214. **CATTLE INSTRUMENT CASE.** Large polished oak case containing the same instruments and supplies as No. A212, and in addition a complete Garget Outfit, and a Sinus (or General Syringe). With directions for use..... 20.00

**CHARTS OF ANIMALS,** see general heading Charts.

A220. **DOUBLE-TREE APPARATUS**, for determining the correct position of the single-trees, so that the double-tree may be an evener. This apparatus is essentially a lever of the first class. It consists of a cast iron base smoothly finished and painted, to which is attached an upright standard. At the top of this standard is a brass fork, in the prongs of which are cut V's in which rests the axis, passed through the central point of the polished brass beam which represents the double-tree. Pins which represent attachments of single-trees to the double-tree are provided to fit into holes drilled in the brass beam, two of which holes are equidistant from the central point and in the same straight line with it. A string resting on these pins is connected at its extremities with two brass scale pans of equal weight. The scale pans represent the draft and the strings the line of draft. A metal scale, one end of which is fastened at its zero point to the upright in a line directly beneath the central point, serves as a measure in determining the distance of the lines of draft from this central point. The base is provided with screws and the apparatus is furnished with plumb bob for leveling. Complete as illustrated..... 25.00



No. A220.



No. A230.

No. A236.

**A230. GRADE-DRAFT APPARATUS.** This ingenious device designed by Prof. Gibbs demonstrates clearly and easily the factors governing grade-draft. With each instrument is sent a pamphlet as a guide in the quantitative study of the following problems:

1. Effect of Size of Wheels on Draft.
2. Effect of Wide and Narrow Tires on Draft.
3. Sliding and Rolling Friction.
4. Effect of Size of Axle on Draft.
5. Effect of Road Grade on Draft.
6. Effect of Road Obstruction on Draft.
7. Effect of Angle of Hitch on Draft.

The apparatus consists of a substantial metal base provided with three leveling screws, to which is attached a casting to support the metal track. The device illustrated resting on the track is built up in sections in such a way that disks 4.5 and 1.5 inches in diameter may rest on the track at will. These disks represent large and small wheels and are used in the study of Effect of Size of Wheels on Draft.

The 4.5 inch disk is further divisible into two sections  $\frac{3}{4}$  and  $\frac{1}{4}$  inch thick representing  $\frac{3}{4}$  and  $\frac{1}{4}$  inch tires in the study of Effect of Wide and Narrow Tires on Draft.

The line of draft in all experiments is represented by the string attached to the carriage. This string is run over a pulley adjustable in the segment to vary the Angle of Hitch. It then passes over a second pulley to a pail to which it is attached. This pail, with the different quantities of bird shot which may be added, represents the draft.

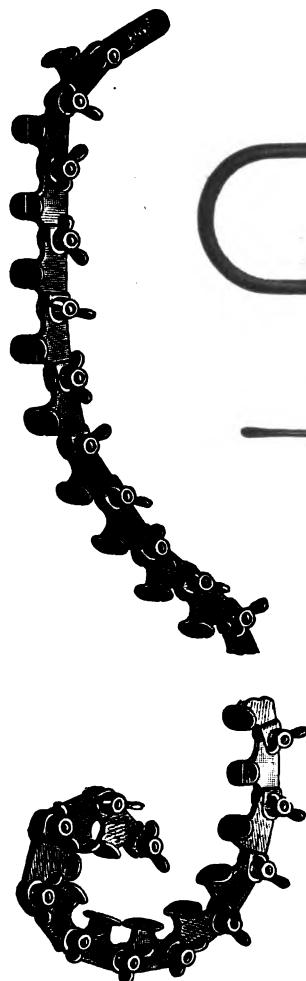
In the study of draft relative to hard and soft roads, leather strips, which represent the soft road, are provided, which may be attached to the steel track. A road obstruction is represented by two metal pieces (shown in front of wheels) which may be placed on the track giving an obstruction 0.05 inch high.

This instrument is accurately made in every detail and quantitative results may easily be obtained with a high percentage of precision. Its utility in demonstrating in the laboratory factors dealing with problems of draft will recommend it to both Physicists and Agriculturists.

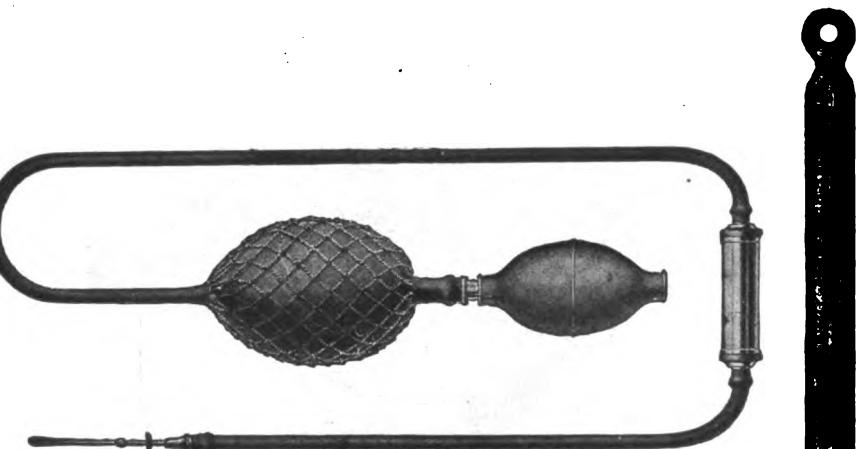
Complete with large and small pail and full experimental directions.....\$125.00

F2345. LEAD SHOT, for use with No. A230 Grade-Draft Apparatus .....Per lb. .25

A236. KILLING KNIFE, Poultry, of finely tempered steel, with nickel-plated handle; blade sharpened on one edge ..... .65



No. A260.



No. A272.



No. A280.

No. 13548.

A260. **MEASURING CHAIN**, designed in the Department of Dairy Husbandry of the University of Missouri, for taking accurate cross sections of the bodies of animals, or of the external shape of any parts of the bodies. This chain is constructed of short links so fastened together that it is sufficiently rigid to hold any shape given it, and yet sufficiently flexible to adapt itself to the shape which it is desired to measure. It is 150 cm long, which makes it possible to measure the heart girth of the largest cattle by the method described below.  
In taking the cross section outline of a large animal, a string is first placed around the body at the point where the measurement is to be made, and a chalk mark is drawn coincident with the location of the string. The chain is then applied over the chalk mark, taking one-half of the body at a time, and tightening the thumb screws so that the chain retains the exact shape of the body. After each measurement the chain is laid on a large sheet of paper, and the points which were in contact with the surface of the body are marked, the outline being filled in later from these points..... \$12.00

A272. **MILK FEVER APPARATUS**, Boston, fitted with improved non-return flow valve milking tube. The apparatus provides for the injection of sterilized atmospheric air through each teat until the udder is distended..... 2.75

**SCORE CARDS** for Animals, see general heading **Score Cards**.

13548. **THERMOMETER**, Clinical Veterinary, first grade, pear-shaped bulb, ring top, with magnifying tube, in hard rubber case, with factory certificate ..... 1.75

**THERMOMETERS**, Dairy, see **Milk Testing Apparatus**.

A280. **TUBERCULIN TESTING OUTFIT**, Boston, consisting of syringe, three needles, trocar, thermometer and 40 cc of Tuberculin, which is sufficient for ten tests..... 6.20

A281. **TUBERCULIN, H. K. Mulford's**, 40 cc; sufficient for ten tests..... 1.25



### APRONS, OVERSLEEVES AND LABORATORY COATS

236. **APRON**, light weight, of pure black rubber cloth, acid and waterproof, very flexible, accommodating itself easily to any position of the body. Length, 48 inches..... \$1.40

238. **OVERSLEEVES**, of same material as No. 236 Apron, with elastic bands at top and bottom .70

240. **APRON**, of pure white rubber cloth, especially suitable for use in bacteriological and biological laboratories. Length, 48 inches..... 1.60

242. **OVERSLEEVES**, of same material as No. 240 Apron, with elastic bands at top and bottom. Per pair .80

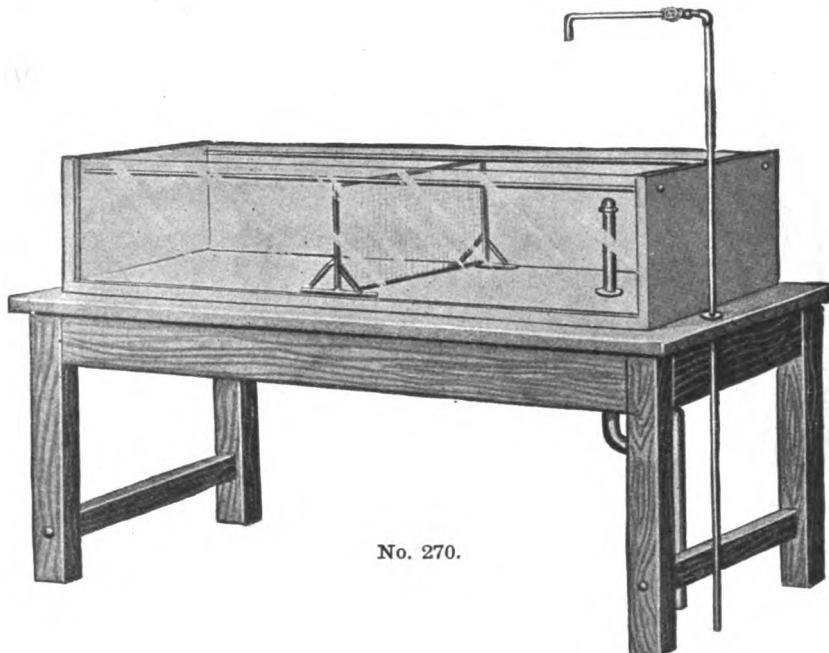
244. **APRON**, heavy weight, of pure maroon rubber cloth, of highest quality, very durable and resistant to chemical reagents. Length, 48 inches ..... 2.00

246. **OVERSLEEVES**, of same material as No. 244 Apron, with elastic bands at top and bottom. Per pair 1.00

252. **LABORATORY COAT**, of white drill, affording complete protection to the clothing. Widely used in bacteriological, biological, food and flour laboratories. Buttons are easily removable for laundering; with three pockets and adjustable strap in back. Length, 54 inches. In ordering, give chest measure taken loose fitting ..... 3.35

258. **DISSECTING OR OPERATING GOWN**, short sleeved, of white drill, with one pocket and straps for fastening at neck and waist. Especially suitable for bacteriological and anatomical laboratories. Length, 52 inches. (Can be furnished in 58 inch length if desired.) In ordering, give chest measure taken loose fitting ..... 3.00

260. **DISSECTING OR OPERATING GOWN**, same as No. 258, but with long sleeves. Length, 52 inches. (Can be furnished in 58 inch length if desired.) In ordering, give chest measure taken loose fitting ..... 3.30

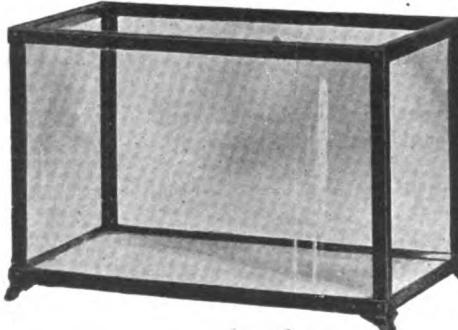


### AQUARIA

270. **AQUARIUM, Tank and Table**, handsome in appearance, and exceptionally well built. The ends and bottom are made of Alberene stone, with front and back of clear plate glass. The glass is set in the stone, and cemented water-tight. Brass rods along the top edges of the glass add to its rigidity. The plumbing fixtures supplied consist of a vertical supply pipe of brass, nickel-plated, with one outlet controlled by a valve; one vertical overflow plug and trap; and piping to the floor line. All piping and fittings are of brass. The wire gauze partition is of brass, and is used to divide the aquarium into two sections of varying sizes, as the partition is movable. The table is very heavy and substantial, of oak, with  $1\frac{1}{2}$  inch birch top.  
The tank measures outside, 50x24x15 inches deep. The table top measures 58x32x30 inches high.  
The top of the table is furnished in natural water-proof finish; the body of the table is given one coat of filler and two coats of cabinet rubbed varnish, light antique, unless otherwise ordered. Weight of the table crated, 180 pounds; of the tank, 400 pounds. Complete as described above with tank, table and fixtures ..... \$116.60

271. **AQUARIUM TANK** only, with fixtures, as described under No. 270..... 91.30

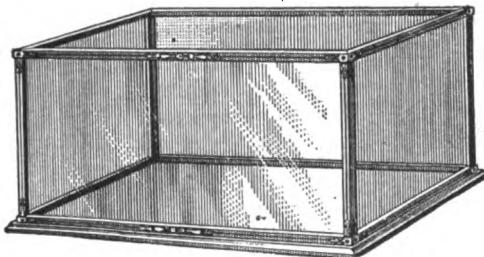
272. **AQUARIUM TABLE** only of No. 270..... 25.30



No. 274.

274. **AQUARIA**, steel frame, slate bottom, heavy glass sides; well made and nicely finished. The measurements in the table below are in inches over all.

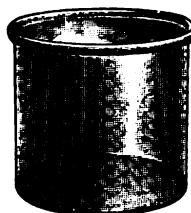
No. ....	A	B	C	D	E
Length, inches .....	12 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	20 $\frac{1}{2}$	22 $\frac{1}{2}$
Width, inches .....	7	9	11	13	13
Height, inches .....	10	11	12	13	14
Capacity, gallons .....	3	6	9	12	15
Each .....	4.80	5.80	7.00	8.00	10.50



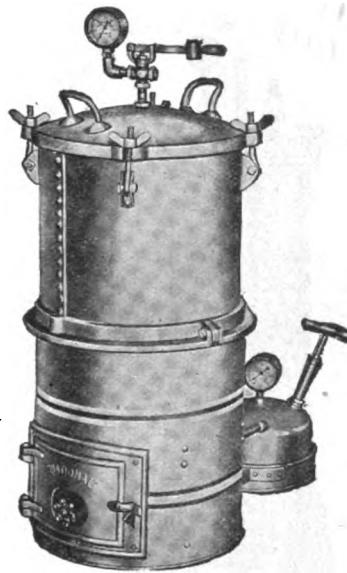
No. 276.



No. 8042.



No. 286.



No. 426.

276. **AQUARIUM**, iron frame, slate bottom, heavy glass sides; strong and durable. An entirely satisfactory and serviceable aquarium. Dimensions over all: 26½ inches long, 17 inches wide, and 15 inches high. Capacity, 20 gallons ..... \$27.50

278. **AQUARIUM**, same as No. 276, but provided with inlet nipple with lock nuts, and outlet fitting with double standpipe. The construction of this standpipe prevents clogging of the outlet and consequent overflow..... 39.50

280. **AQUARIUM**, same as No. 276, but with plate glass sides, and with over all dimensions: 39 inches long, 19 inches wide, and 21 inches high. Capacity, 50 gallons..... 65.00

282. **AQUARIUM**, same as No. 280, but with inlet nipple and outlet with double standpipe, as described under No. 278..... 77.00

**8042. AQUARIA, Battery Jars**, of clear white glass, with ground rim.

No.	A	B	C	D	E
Diameter, mm.....	100	100	125	150	225
Height, mm.....	100	125	175	200	300
Each .....	.55	.70	1.05	1.25	3.10

**286. AQUARIA, Round**, of white glass, with reenforced rim.

No.	A	B	C	D
Diameter, mm.....	175	225	250	300
Height, mm .....	175	225	250	300
Approximate capacity, liters.....	4	8	12	20
Each .....	1.85	2.50	4.15	6.00

**AUTOCLAVES, Pressure Sterilizers**, single wall, made of steel boiler plate, riveted and calked at the seams, with heavy flange. The cover is of semi-steel with sanitary packing and thumb screw clamps to hold firmly in place, and is provided with handles. The equipment includes polished copper grate tinned inside to hold articles to be sterilized, platform for grate, safety valve, steam gage, steam circulating device, thumb-nut wrench, and cover lifting device (on two larger sizes). Finished in aluminum bronze. When ordered without burner or coil, adjustable support stand will be furnished.

No.	A	B	C
Tested for pressure, pounds.....	30	50	50
Height of retort, inches.....	18	18	27
Diameter, inches.....	12	18	25
Height over all, inches.....	39½	40½	53
Width over all, inches.....	26	30	40
Sterilizing capacity, cubic inches.....	1350	2475	7620
Shipping weight, pounds.....	130	235	440
Size of crate, inches.....	11½x13	14x15	21x22
Without gas burner or coil.....	50.00	65.00	125.00
With gas burner.....	60.00	85.00	145.00
With gasoline burner.....	60.00	85.00	145.00
With steam coil.....	60.00	85.00	145.00
With coil and gas burner.....	65.00	90.00	150.00
With coil and gasoline burner.....	65.00	90.00	150.00



Nos. 440-442.



No. 486.

**AUTOCLAVES, Vertical Type,** with seamless boiler, made of drawn copper, highly polished and lacquered. The cover is of cast brass, nickelized, is ground on the bevel to fit inside flange of boiler, which is provided with thumb screws to clamp lid firmly in place. Provided with rack for supporting articles to be sterilized. The autoclave is guaranteed to stand a pressure of 50 pounds. Complete with thermometer, pressure gage registering to 30 pounds, safety valve, escape valve for air and steam, sheet iron base 8 inches high, and an asbestos mat.

	No. ....	A	B	C
440.	Height inside, inches.....	12	24	26
441.	Diameter inside, inches.....	8	11	13
442.	Arranged for gas heat.....	\$ 82.50	104.00	129.00
	Arranged for oil heat.....	87.00	110.00	138.00
	Arranged for electric heat.....	137.50	159.00	195.00

For **STERILIZERS** of other types, see general heading **Sterilizers**.

**BACTERIOLOGICAL APPARATUS**, see special headings, **Autoclaves, Incubators, Sterilizers, etc.**

## CENCO ANALYTICAL BALANCE

**BALANCE, Cenco Analytical**, designed to meet the needs of educational and commercial laboratories for an economical analytical balance.

Made specially for us by one of the largest and best known balance makers in America, it has all of the special features which have made their balances distinctive. The entire cost of the balance is in essentials, as the balance has been simplified and the cost of construction reduced to the lowest possible figure by means of automatic processes and machinery. We believe that a comparison of this balance with those of other makes, either American or foreign, will show it to be superior to any balance now obtainable for the same amount.

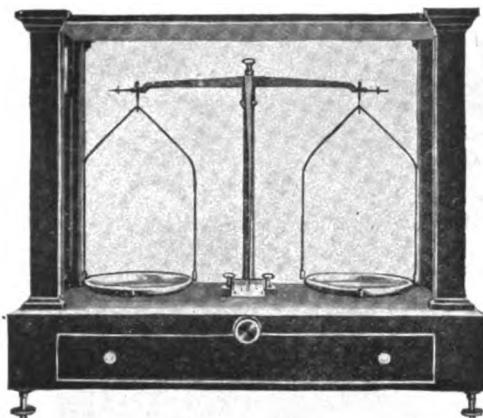
### Specifications:—

Beam .....	polished aluminum	Capacity .....	200 grams.
Length of beam.....	6 in. graduated in 1/5th mg	Sensitivity .....	1/10 mg.
Divisions of beam.....	50 to right of center.	Knife edges and bearings.....	agate.
Size of case.....	16 1/4 x 17 x 9 1/4 inches.	Weight of rider.....	10 mg.

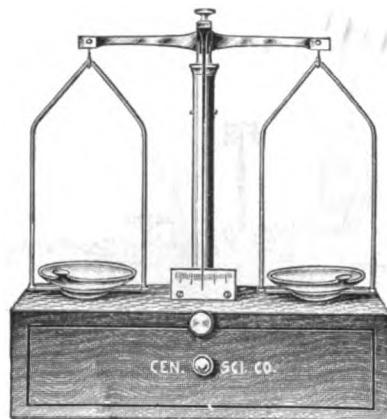
### Distinctive features:—

- Knife edges free from contact when balance is at rest.
- Independent arrests for beam, stirrups and pans.
- Fenders at end of stirrup supports to check extreme swing of beam and prevent jarring or sliding of stirrups on knife edges.
- High sensitivity and rapidity of swing.
- Graduations of beam white on black background.
- Index plate graduated in red.
- No steel in construction of balance and hence no corrosion.
- Case of fine polished mahogany with counterpoised front door and glass on all sides.
- Simple rider construction with patented rider hook.

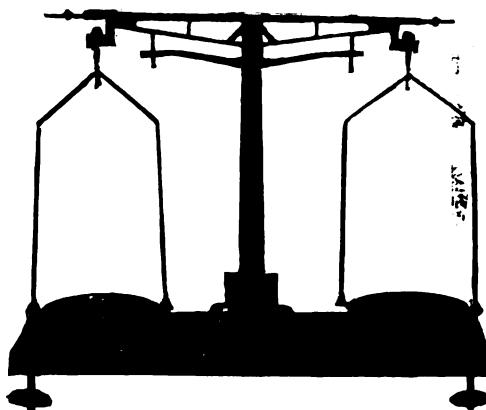
486. **BALANCE, Cenco Analytical**, with wooden case and leveling screws..... \$47.50  
488. **BALANCE, Cenco Analytical**, same as No. 486, but with black plate glass base..... 55.00



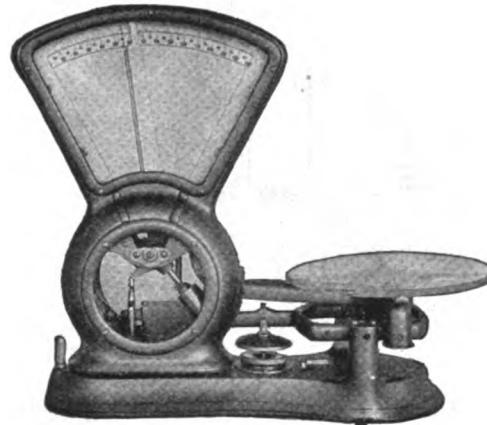
No. 508.



No. 514.



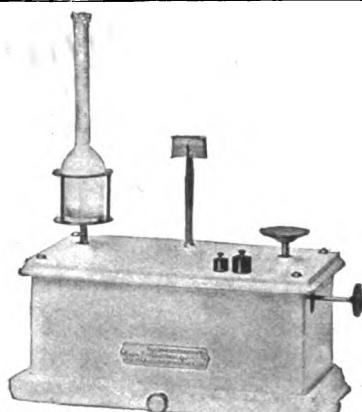
No. 512.



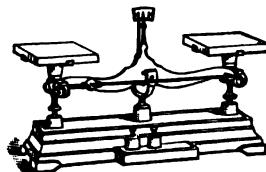
No. 550.

**BALANCES, Chemical**, provided with leveling screws (except No. 502A), fitted with steel bearings, adjusting screws on end of beam, and weight pans with handles. Nos. 502A-F are mounted on polished mahogany box with drawer; Nos. 508B-F in a polished mahogany case with drawer, level, and counterpoised sliding front door.

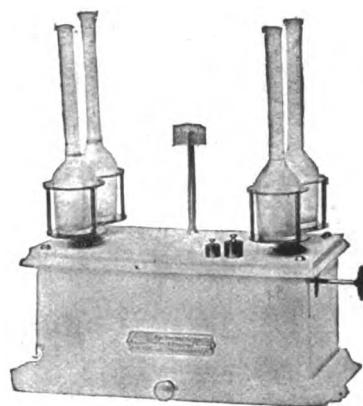
No.	A	B	C	D	E	F
Capacity, g.....	60	60	150	300	600	1500
Sensibility, mg.....	1	1	2	5	5	10
Diameter of pans, mm.....	75	75	88	100	125	150
Beam length, mm.....	150	150	200	225	275	300
502. <b>BALANCE</b> , on box.....	\$13.00	17.00	22.25	31.50	38.00	40.50
508. <b>BALANCE</b> , in case.....	.....	26.00	31.25	43.00	53.50	66.50
512. <b>BALANCE, General Laboratory</b> , made entirely of magnalium which offers a high degree of resistance to all laboratory fumes. It has the further advantage of being light and strong. The knife edges and bearings are of agate. The beam is graduated and notched to facilitate the use of rider. Provided with beam support and leveling screws. Capacity, 100 grams; sensibility, 2 mg; diameter of pans, 75 mm.....	.....	.....	.....	.....	.....	23.50
514. <b>BALANCE, Chemical</b> , with eccentric lift. Beam 150 mm long, pans 65 mm in diameter. Mounted on base with drawer. Sensibility, 1 centigram .....	.....	.....	.....	.....	.....	10.00
548. <b>BALANCE, Automatic</b> , with weighing chart having a range of 500 grams by 5 gram divisions. Accurate reading is made possible by the hair line pointer provided. Agate bearings and hardened steel pivots throughout, with oil dash pot for regulating the sensibility of the balance. Equipped with a round glass plate and finished in blue enamel. Each 5 gram division is 1.635 mm wide.....	.....	.....	.....	.....	.....	55.00
550. <b>BALANCE, Automatic</b> , same as No. 548, but with chart having a range of 1500 grams by 5 gram divisions. Each division is .68 mm wide.....	.....	.....	.....	.....	.....	65.00



No. 518.



No. 556.



No. 518.



No. 560.



No. 562.

556. **BALANCE, Cream Test**, for use in connection with Babcock Test. Especially designed for very accurate weighing of cream. Metal parts galvanized to make them rust-proof; porcelain plates 3 x 3 inches, and agate bearings. The bar in front of the balance is used for balancing bottle and is provided with the necessary weight. This scale is compact, being but 10½ inches long, and being of careful construction is accurate. Complete with one each 9 and 18 gram weights. Capacity, one bottle; sensibility, 100 mg..... \$14.50

516. **BALANCE, Torsion, Cream Test Balance**. Enclosed in white enamelled box with index and arrest, counterpoise beam with sliding weight inside operated from without. Object pan constructed especially for holding one milk or cream test bottle. Capacity, 1 bottle; sensibility, 8 milligrams. Complete with one 9 gram and one 18 gram weight. Dimensions, 10 x 5½ x 9 inches over all..... 20.00

518. **BALANCE, Torsion, Cream Test Balance**. Same construction as above, but with each pan designed to hold two cream test bottles. Capacity, 4 bottles; sensibility, 8 milligrams. Complete with one 9 gram and one 18 gram weight..... 24.00

560. **BALANCE, Cream, Wisconsin Hydrostatic**. This balance has been devised to meet the demand for a simple and correct method of weighing cream into test bottles and consists of a specially devised brass float, which is placed in a cylinder of water. Very accurate weighings can be made with this instrument, and as there are no bearings to rust it will retain its sensitiveness indefinitely. Complete with metal cylinder, float and 9 gram weight, but without bottle.. 5.50

562. **BALANCE, Decimal Milk**. This spring scale is intended especially for use in connection with the Babcock Test for keeping records of the quantity of milk from individual cows, together with the percentage of fat, so as to calculate the butter yield. The scale is provided with a loose pointer, which by means of a thumb screw may be set anywhere on the dial to offset the weight of the milk pail. The readings being in pounds and decimals of pounds makes the calculation very much simpler than when pounds and ounces are given as on the ordinary scale. (Decimal divisions not shown in the illustration.) Capacity, 30 pounds, weighing by 1/20 pound..... 5.60

564. **BALANCE, Decimal Milk**. Same as No. 562, but with capacity of 60 pounds, weighing by 1/10 pound..... 8.50



No. 566.



No. 520.



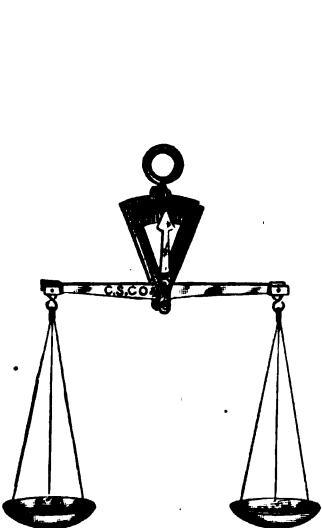
No. 522.

566. **BALANCE, Family Scale, Standard**, with slanting white enameled dial; weighs 24 lbs. by 1 oz. divisions; with square sheet steel platform and tin scoop..... \$3.80

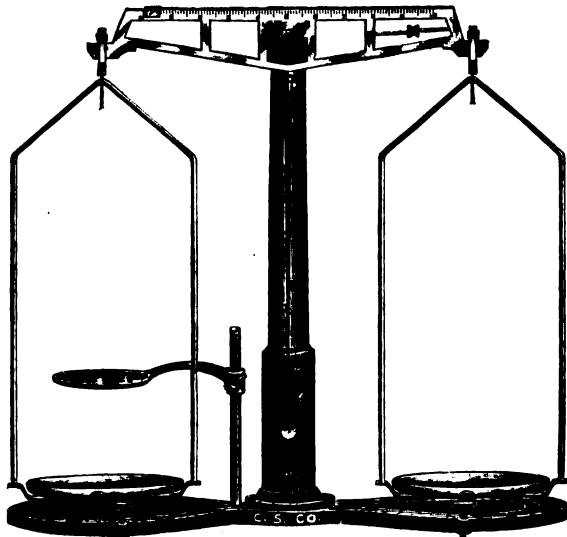
568. **BALANCE, Family Scale, Metric**. Same as No. 566, but for weighing 10 kilos by 50 gram divisions ..... 3.80

520. **BALANCE, Torsion, Grain Test**, designed according to suggestions of the United States Department of Agriculture expressly for determination of moisture in grain, according to Bulletin No. 99, United States Bureau of Plant Industry. Slide beam, 9 inches in length, graduated to 10 grams by 1/10th; scoop,  $10\frac{1}{2} \times 5\frac{1}{2} \times 2\frac{1}{2}$  inches with spout for pouring directly into flask; weight plate, 4 inches in diameter; capacity, 1 kilogram; sensibility,  $6\frac{1}{2}$  centigrams. Complete with set of brass weights in block, from 5 grams to 100..... 26.00

522. **BALANCE, Torsion, Grain Test**, designed especially for grading corn according to the requirements of the Federal Corn Grades. Same construction as No. 520, but with 9 inch beam graduated to furnish four simultaneous readings: 100% by  $\frac{1}{2}\%$ , 200 grams by 2 grams,  $8\frac{1}{4}$  ounces by  $\frac{1}{8}$  ounce, and 70 pounds per bushel by 1 pound. These graduations render the balance useful in grain laboratories for a great variety of purposes, such as moisture determinations; percentage of dirt, cracked and broken grains; bushel weight, etc..... 27.00



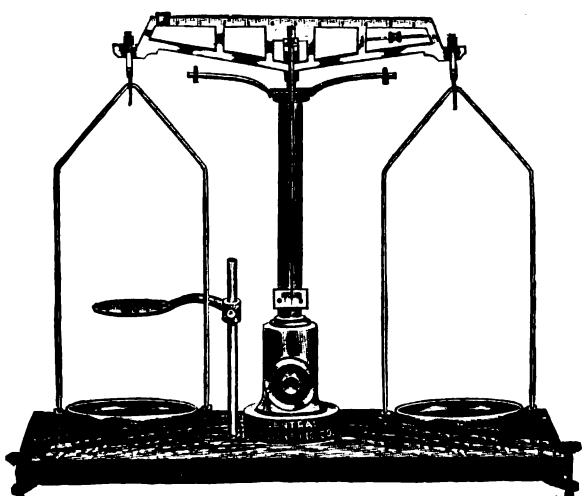
No. 570.



No. 572.

570. **BALANCE, Hand**, improved design. Manufactured by us to replace the cheaply made European balances. The supporting stirrup is shaped at the top to form a graduated index plate, enabling the observer to tell more accurately when the beam is level; it also limits the motion of the beam, preventing the weights from being scattered by a sudden swing. Constructed of brass with 8 inch beam and 3 inch horn pans supported by cords. Weighs accurately to 1 centigram ..... \$4.00

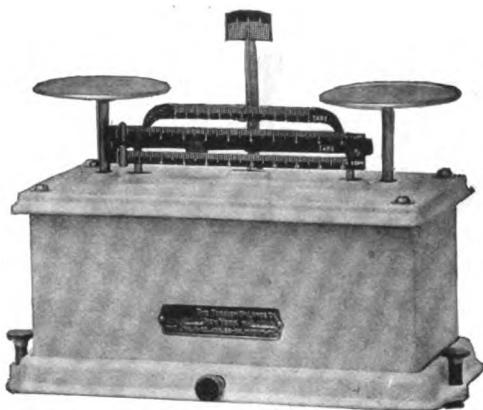
572. **BALANCE, Laboratory**, designed for those desiring a more sensitive and convenient form of balance than the Harvard Trip scale.  
Capacity, 2 kilos.  
Sensitivity. Loads up to 2 kilos can be readily weighed within 0.05 grams. Sensibility on light loads is much greater.  
Beam, open construction. A rider upon beam indicates all amounts up to 10 grams by 1/10 gram divisions, each division being 2.54 mm long, making small weights unnecessary.  
Damping Device, positive in action, brings balance quickly to rest.



No. 574.

An Adjustable Shelf for specific gravity work is included ..... 20.00

574. **BALANCE, Laboratory**, similar to No. 572, but more sensitive and of better finish and construction. Mounted on polished, mahogany finished base provided with leveling screws. Sliding rider on graduated beam indicates weight up to 10 grams in 1/10 gram divisions. Prismatic steel bearings and supports. An eccentric movement operated by knurled head raises beam from beam arrest. Provided with shelf for specific gravity work. Made of brass finely finished; pans of aluminum. Plumb bob and protected adjusting screw as in No. 572. Height of balance, 48 cm; diameter of pans, 14 cm; length of beam (between knife edges), 32 cm. Capacity, 2,000 grams. Sensibility with full load, 30 milligrams or less, which is increased with smaller loads ..... 35.00



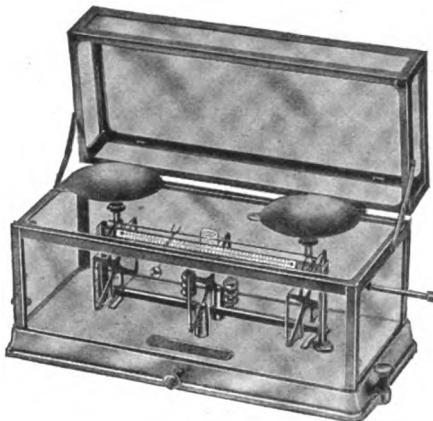
No. 524.



No. 526.



No. 528.



No. 530.

524. **BALANCE, Torsion, Moisture.** Enclosed in white enamelled case with leveling screws and index; four beams with sliding weights; two upper beams graduated for tare or counterpoise; lower beams graduated to 10% by 1/10th, and 20% by 2/10ths, so that from 1/10th of 1 per cent to 30% of moisture in 10 gram samples can be determined without calculation. Especially valuable for moisture in butter. Pans, 3 inches in diameter, of brass nickel plated; capacity, 120 grams; sensibility, 13 milligrams. Dimensions, 10 x 5 1/2 x 9 1/2 inches over all..... \$20.00

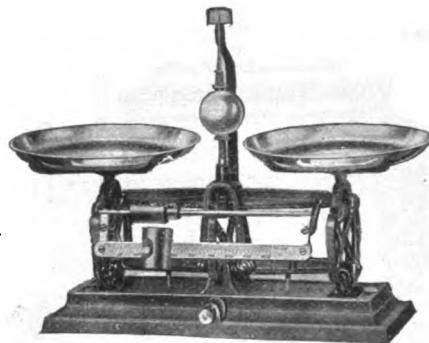
526. **BALANCE, Torsion, Moisture,** for determining moisture by evaporation from coal, grain, etc. Fitted with scoop 10 1/2 x 5 1/2 x 2 1/2 inches with spout for rapid pour out. Weight plate, 4 inches in diameter; slide beam, 12 inches in length graduated on upper side to 1 pound by 1/10th ounce; on lower side to 100% by 1%. Capacity, 2 pounds; sensibility, 5 grains..... 34.00

528. **BALANCE, Torsion, Seed Testing,** designed especially for seed analysis and for acidity of corn, as described in Bulletin 102, United States Department of Agriculture. Enclosed in glass case with cover, metal parts nickel plated throughout. Object pan shaped to form scoop, 3 1/2 x 2 1/2 x 1 1/2 inches; weight pan of German silver 3 inches in diameter. Beam inside case graduated to 500 milligrams by 5 milligrams. Capacity, 120 grams; sensibility, 2 milligrams. Dimensions, 13 x 6 1/4 x 6 1/2 inches over all..... 52.00

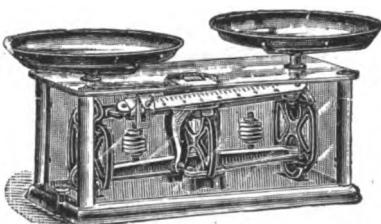
530. **BALANCE, Torsion, Solution or Prescription,** in glass case with cover. Provided with slide beam graduated from 500 to 5 milligrams, with rider operated from outside of glass case. Pans of German silver 3 inches in diameter; capacity, 120 grams; sensibility, 2 milligrams. An excellent balance for use in making up volumetric solutions, or for prescription work. Dimensions, 13 x 6 1/4 x 6 1/2 inches over all..... 45.00



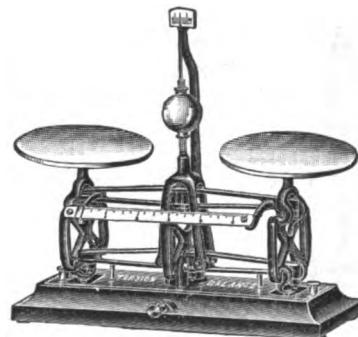
No. 532.



No. 536.



No. 540.



No. 544.

532. **BALANCE, Torsion, Solution**, with 9 inch nickelized brass pans and slide beam, and with high poise ball and index. Length of beam 12 inches, graduated to 450 grams by 5 grams; capacity of balance, 4½ kilograms; sensibility, 15 centigrams ..... \$27.00

534. **BALANCE, Torsion, Solution**, similar to No. 532, but with 9 inch beam, and 6 inch pans. Capacity, 2 kilograms; sensibility, 6½ centigrams. Slide beam graduated to 100 grams by 1 gram. ..... 25.00

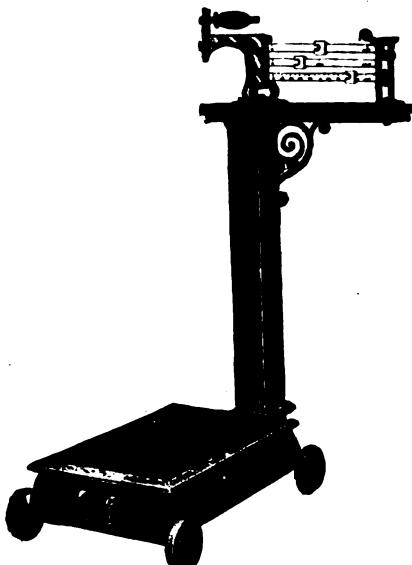
536. **BALANCE, Torsion, Solution**, same construction and specifications as No. 532, but with counter-poised beam. Bottles, casseroles or beakers may be tared by sliding weight on beam, facilitating weighing and eliminating errors. Capacity, 4½ kilograms; sensibility, 25 centigrams 30.00

538. **BALANCE, Torsion, Solution**, same construction and specifications as No. 534, but with counter-poised beam and tare weight as in No. 536. Capacity, 2 kilograms; sensibility, 12½ centigrams. ..... 28.00

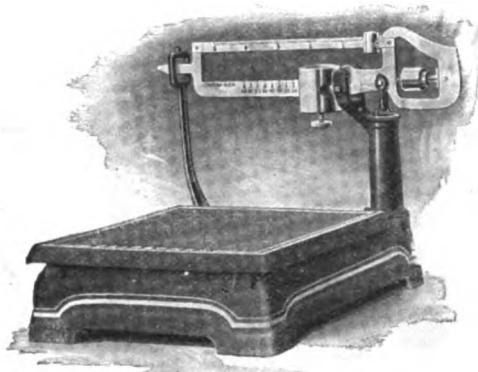
540. **BALANCE, Torsion, Solution**, in glass and metal case, nickel-plated throughout. Slide beam inside case graduated to 100 grams by 1 gram, with rider operated from outside. Nickelized brass pans 9 inches in diameter. Capacity of balance 4½ kilograms; sensibility, 20 centigrams. Dimensions, 20½ x 9¾ x 9½ inches over all..... 45.00

542. **BALANCE, Torsion, Solution**, same construction as No. 540, except provided with poise ball and index, increasing the sensibility to 6½ centigrams. Slide beam graduated to 10 grams by 1/10th. Dimensions, 19½ x 11¾ x 8½ inches over all..... 60.00

544. **BALANCE, Torsion, Soil**, with flat porcelain plates, 6 inches in diameter. Slide beam 9 inches in length, graduated to 10 grams by 1/10th. Capacity, 1 kilogram; sensibility, 6½ centigrams. High poise ball and index..... 26.00



No. 580.



No. 584.



No. 588.

580. **BALANCE, Platform Scale**, with patented combination beam. Graduated on one side of beam to 500 pounds by  $\frac{1}{2}$  pound divisions; on other side to 175 kilos by 100 gram divisions. No loose weights, as full capacity is on the beam. Mounted on wheels..... \$70.00

584. **BALANCE, Platform, Express Package Scale**, with platform  $10\frac{1}{4} \times 12$  inches, with double beam, lower bar graduated to 50 pounds by 5 pounds, upper to 5 pounds by 1 ounce. Finished in maroon, ornamented ..... 24.00

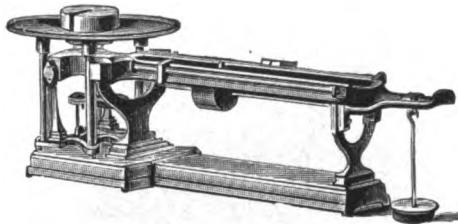
586. **BALANCE, Platform, Express Package Scale**, as above, but with lower beam graduated to 20 kilograms by 1 kilo, upper to 2 kilograms by 20 grams..... 24.00  
(Note: This graduation is made to order only, and we can not promise immediate delivery.)

588. **BALANCE, Platform, Automatic Scoop**. In the center of the platform is a depression into which the base of the scoop fits, automatically engaging the counterpoise, thus eliminating errors through removal of the scoop. Provided with reinforced, seamless brass scoop,  $21\frac{3}{4} \times 10 \times 6$  inches, all brass parts heavily nickelated. Finished in maroon. Platform  $15 \times 12$  inches. Double beam of brass, lower bar graduated to 50 pounds by  $\frac{1}{2}$  pound, upper bar to 15 pounds by 1 ounce. Rest of 250 pounds capacity can be obtained through counterpoise weights on weight hanger ..... 52.00

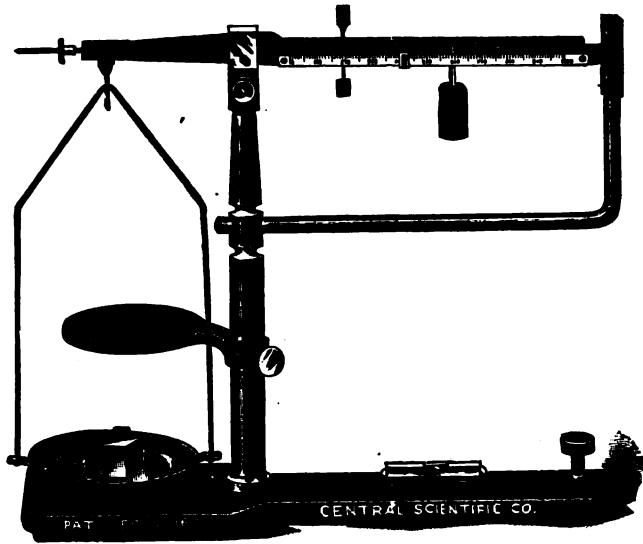
590. **BALANCE, Platform, Automatic Scoop**, as above but with lower bar graduated to 20 kilograms by  $2/10$  kilos, upper to 6 kilograms by 20 grams ..... 52.00  
(Note: This graduation is made to order only, and we can not promise immediate delivery.)

592. **BALANCE, Platform**, same as No. 588, but with solid platform without scoop and scoop balance attachment ..... 44.00

594. **BALANCE, Platform**, same as No. 590, but with solid platform without scoop and scoop balance attachment ..... 44.00



No. 606.

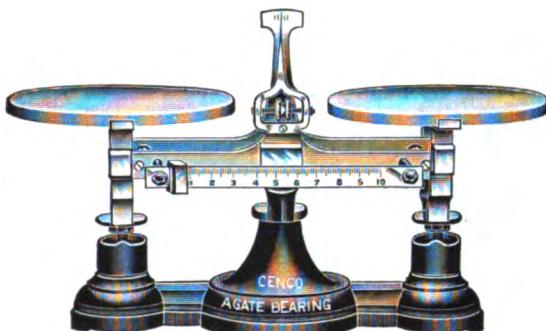


No. 658.

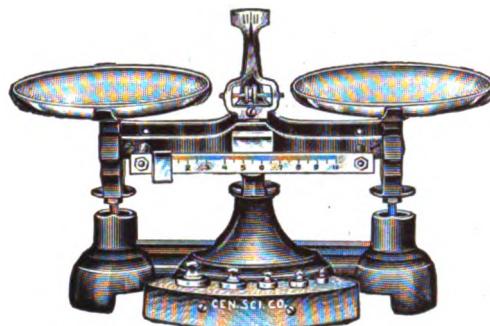
606. **BALANCE, Platform**, provided with two weighing beams and sliding poises. One beam is divided into one hundred parts, each part representing one gram; the other beam is divided into ten parts, each part representing one hundred grams. A bar with sliding poise is placed under the weighing beams for the purpose of balancing the empty bottle or container, which is quickly done by sliding the poise along the bar until a correct balance is secured. This balance will be found indispensable where quantities up to 20 kilos need to be weighed with accuracy. Sensibility, 1 gram..... \$50.00

658. **BALANCE, Triple Beam**, Cenco, for physical and chemical laboratories. The three beams are placed in the same horizontal plane, thus conforming to scientific principles involved, which is not true of other styles of Triple Beam Balances. Weighings are obtained by movement of the riders along the beams. These riders are easily handled and quickly placed in the notches, but cannot be removed from the beams. An adjustable support is provided for a jar or other receptacle for experiments in specific gravity. Provided with stable base neatly japanned, and with sensitive spirit level and leveling screw. Balance neatly finished in nickel plate and japan. Capacity of middle beam, 100 grams by 10 gram divisions; back beam 10 grams by 1 gram divisions; front beam, 100 centigrams by 1 centigram divisions. Total capacity, 111 grams; sensibility, with or without full load, guaranteed to 1 centigram. Actual tests, however, give a sensibility of from 4 to 8 milligrams. Diameter of pan, 9.5 cm; width of bow, 10.5 cm; height of bow, 22 cm. Features easily recognized are: rapid weighing, constant sensibility, accuracy, freedom from loss of weights, no interference or breaking of weights... \$22.50

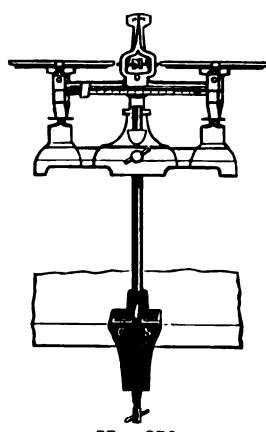
660. **WEIGHT, Extra**, for use with No. 658, for weighing over 111 grams, but not to exceed 201 grams. Weight is placed on the 100 gram notch of the middle beam. Sold only at the same time with No. 658..... 2.50



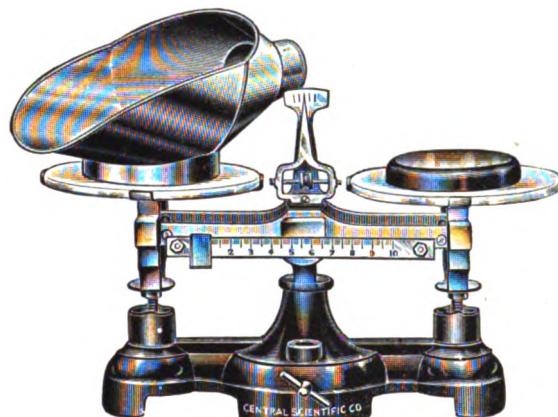
No. 648.



No. 652.



No. 650.



No. 654.

**648. BALANCE, Trip Scale, Cenco Agate Bearing, Harvard design.** In this trip scale we have done away with the rough cast and forged iron parts used for years in the Harvard Trip Scale, and employ parts of brass and steel neatly formed by elaborate tools and machinery. This makes possible a degree of perfection never before attained in assembling this style of balance. We have discontinued altogether the cheap imported balances of the Robervahl type, as we believe the superior accuracy and durability of the Cenco Trip far outweighs the slight difference in price. The BEARINGS consist of HARDENED STEEL PRISMS resting on SIX AGATE SHELVES of large dimensions. This construction adds very materially both to the initial sensibility of the scale and to its ability to retain its sensibility after long continued use. The graduated beam has a range of 10 grams in 1/10 gram divisions. The capacity of the scale is 2000 grams. Sensibility is guaranteed to be 1/10 gram. Actual tests show a much greater sensibility. The pans are flat porcelain plates 14 cm in diameter.

A very convenient feature of our latest design is a hook placed directly below the knife edges of each scale pan, from which objects may easily be suspended for specific gravity work. A set screw is also provided by means of which the balance may be clamped to a 13 mm support rod, and so elevated above the table top. (See No. 650 Support)..... \$15.00

**648S. BALANCE, Trip Scale, Cenco, same as No. 648, but with steel in place of agate bearings..** 12.00

**650. SUPPORT, for No. 648 Trip Scale.** Consists of a table clamp of special design (No. F197), and a No. F133 Support Rod, 20 cm long. This forms a most convenient means of supporting No. 648 Trip Scale for specific gravity work, as the scale is provided with a set screw for clamping to a support rod, and with specially designed hooks for supporting specimens which are to be weighed under water .....

**652. BALANCE, Dispensing and Solution Scale.** This balance will be found ideal for laboratory and pharmaceutical work. The pans are of heavy nickelized brass, 15 cm in diameter. The graduated beam has a range of 10 grams in 1/10 gram divisions, and brass weights from 10 grams to 100 grams are supplied, conveniently fitted into a projecting holder. Capacity, 2,000 grams. Sensibility is guaranteed to be 1/10 gram; actual tests show a much greater sensibility.... 17.50

**654. BALANCE, Grain Test.** Consists of No. 648S Cenco Steel Bearing Trip Scale with the addition of a funnel scoop and counterpoise, accurately adjusted .....

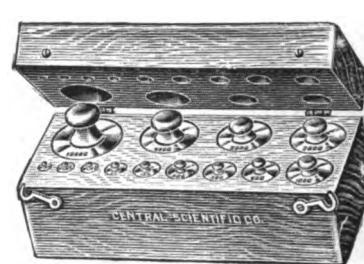
**656. FUNNEL SCOOP AND COUNTERPOISE, only, of No. 654.....** 3.00



No. 718.



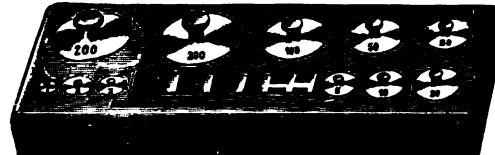
No. 719.



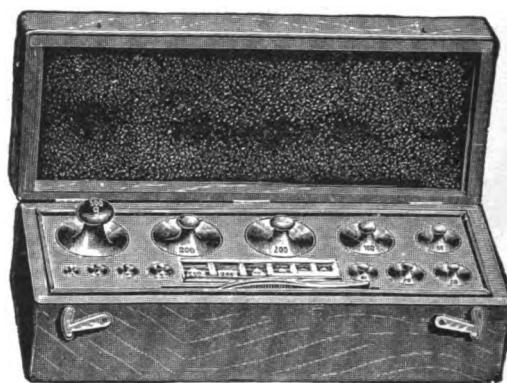
No. 740.



No. 738.



No. 736.



No. 734.

## WEIGHTS

718. **WEIGHTS, Analytical**, designed for student use, accurately adjusted. Gram pieces of solid brass, polished and lacquered. No loose balancing material used as all adjustments are made on knob stem. Fractionals of aluminum, the box of natural mahogany with hinged lid, velvet lined, with separate compartment for each weight. A pair of brass forceps is supplied.

No. ....	A	B
Size 1 mg to, grams.....	50	100
Per set.....	\$12.50	14.00

719. **WEIGHTS, Analytical**, same grade as above except in block without hinged lid.

No. ....	A	B
Size, 1 mg to, grams.....	50	100
Per set.....	10.50	12.00

734. **WEIGHTS, Medium Grade, Metric**, gram pieces of solid brass, flat shape, heavily lacquered; fractionals of German silver; in polished hardwood box with hinged cover, with forceps; with separate compartment for each weight; fractionals under glass cover.

No. ....	A	B	C	D	E	F
Size 1 mg to, grams.....	20	50	100	200	500	1000
Per set.....	5.50	6.50	8.50	11.00	14.50	18.00

736. **WEIGHTS, Medium Grade, Metric**, same quality as No. 734, but in polished hardwood block instead of box, with brass forceps.

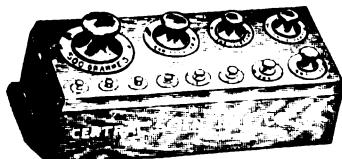
No. ....	A	B	C	D	E	F
Size 1 mg to, grams.....	20	50	100	200	500	1000
Per set.....	3.60	4.50	5.50	6.50	11.00	15.50

738. **WEIGHTS, Metric**, separate weights, same quality as No. 734 and 736, for replacements.

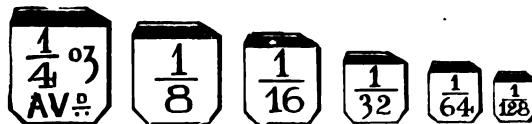
Size, grams .....	1	2	5	10	20	50	100	200	500	1000
Each .....	.30	.35	.40	.45	.55	.65	.90	1.65	2.50	4.50

740. **WEIGHTS, Metric**, of polished brass, flat shape, in hardwood block with hinged cover, suitable for ordinary laboratory work. Nos. A-C are provided with receptacle for the fractional weights which are of German silver. Without forceps.

No. ....	A	B	C	D	E	F
Size ..... 1g-20g	1g-50g	1g-100g	1g-200g	1g-500g	1g-1000g	
Per set..... 2.75	3.35	4.00	5.50	8.50	12.00	



No. 742.



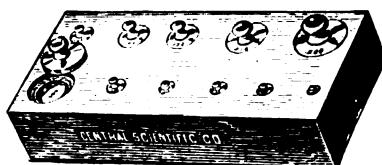
No. 752.



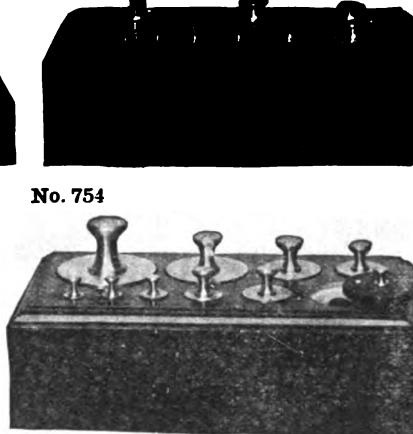
No. 746.



No. 754



No. 758.



No. 764.



No. 766.



No. 768.

742. **WEIGHTS**, Metric, of brass, same as No. 740, but in hardwood block. Without forceps.

No.	A	B	C	D	E	F
Size .....	1cg-20g	1cg-50g	1cg-100g	1g-200g	1g-500g	1g-1000g
Per set.....	\$2.00	2.50	3.50	5.00	7.50	11.00

744. **WEIGHTS**, Metric, Brass, same as Nos. 740 and 742, separate for replacements in other sets.

Size, grams .....	1	2	5	10	20	50	100	200	500	1000
Each .....	.15	.20	.25	.30	.35	.55	.75	1.25	2.25	4.00

746. **WEIGHTS**, Metric, Fractional, of German silver and aluminum. Set 1 to 500 milligrams, with duplicates of 2, 20 and 200 milligram pieces, in polished covered box with sliding cover. Each weight in a separate compartment; with brass forceps .....

Set 1 to 500 milligrams, with duplicates of 2, 20 and 200 milligram pieces, in polished covered box with sliding cover. Each weight in a separate compartment; with brass forceps .....	2.00
---	------

748. **WEIGHTS**, Metric, Fractional, of German silver and aluminum, put up in sets of 1 mg to 500 mg with duplicates of 2, 20 and 200 mg pieces; in pasteboard box.....

Set 1 to 500 mg with duplicates of 2, 20 and 200 mg pieces; in pasteboard box.....	.60
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750. **WEIGHTS**, Metric, Fractional, Single, same as No. 748, for replacements.....

Each .....	.05
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752. **WEIGHTS**, Avoirdupois, of nickel silver, from  $1/128$  to  $\frac{1}{4}$  ounce, consisting of one each  $1/128$ ,  $1/64$ ,  $1/32$ ,  $1/16$ ,  $\frac{1}{8}$ , and  $\frac{1}{4}$  oz.....

Per set .....	2.00
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754. **WEIGHTS**, Avoirdupois, of brass, in hardwood block, carefully adjusted.

No.	A	B	C
Size $\frac{1}{8}$ oz. to, lbs.....	1	2	4
Per set .....	5.00	6.50	9.45

756. **WEIGHTS**, Avoirdupois, same as No. 754, single for replacements.

Size, ounces.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
Each .....	.40	.50	.60	.70	.90	1.10

Size, ounces.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
Each .....	.40	.50	.60	.70	.90	1.10

Size, ounces.....	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
Each .....	.40	.50	.60	.70	.90	1.10

758. **WEIGHTS**, Decimal Pound, brass in block, from 0.5 to 0.001 lb. with duplicates of the 0.1, 0.01, and triplicates of the 0.001 lb. weights. Adds up to make 1 pound. Especially valuable in testing laboratories where results must be reported in English units.....

Per set .....	11.00
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764. **WEIGHTS**, Troy, brass, in hardwood block, adjusted to meet requirements of the Bureau of Standards, Tenth Annual Conference on Weights and Measures. Weights below  $\frac{1}{4}$  ounce furnished in pennyweights and grains unless otherwise specified.

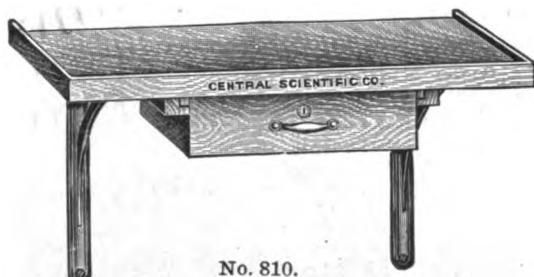
No.	A	B	C	D
Size $\frac{1}{2}$ grains to, ounces.....	1	2	5	10
Per set .....	1.65	3.50	4.75	5.85

766. **WEIGHTS**, Troy, of aluminum, square, from  $\frac{1}{2}$  grain to 10 grains, in pasteboard box. Shape is such that they may be picked up readily.....

Per set .....	1.00
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768. **WEIGHTS**, Troy, from  $\frac{1}{2}$  grain to 5 grains in pasteboard box. Bent from aluminum wire, in shapes convenient to handle.....

Per set .....	.75
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No. 810.



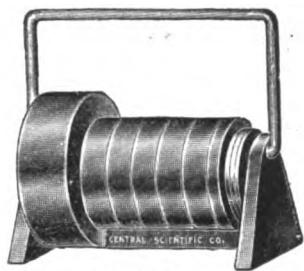
No. 770.



No. 774.



No. 788.



No. 792.



No. 822.



No. 838.

788. **WEIGHTS, Metric, Iron**, in nests, carefully adjusted. Sets have duplicates of 20, 200 and 2000 grams. The 10 kilo weight supplied with handle.

No.	A	B	C	D
Size 5 grams to, kilos..	1	2	5	10
Per set .....	\$3.00	4.50	9.50	15.50

790. **WEIGHTS, Metric, Iron, Single**, same as in No. 788, for replacements.

Size, grams .....	5	10	20	50	100	200	500	Kilos.	1	2	5	10
Each .....	.15	.15	.20	.30	.35	.40	.60		.90	1.50	3.50	6.00

770. **WEIGHTS, Avoirdupois, Iron, sealed, in nests.**

No.	A	B	C	D
Size $\frac{1}{4}$ oz. to, lbs..	1	2	4	8
Per set .....	2.00	2.80	4.00	5.50

772. **WEIGHTS, Avoirdupois, Iron, sealed, same quality as above, single for replacements.**

Size, ounces .....	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	Pounds	1	2	4	8
Each .....	.35	.35	.35	.35	.35	.50		.60	.80	1.25	2.00

774. **WEIGHTS, Avoirdupois, of iron with ring handle.**

Size, pounds .....	1	2	4	10	14
Each .....	.80	1.00	1.60	3.25	4.00

776. **WEIGHTS, Avoirdupois, safety valve.**

Size, pounds .....	4	8
Each .....	1.50	2.50

792. **WEIGHTS, Metric, Iron, Slotted, with holder.** Set consists of one 500, five 100, one 50, two 20 and one 10 gram weights..... 4.00

794. **WEIGHTS, Metric, Iron, Single.** More accurate and of better finish than No. 792, with slot to fit No. 796 Holder. Specially designed for use in experiments with simple machines, forces, etc. Diameter of 10 and 20 gram weights, 38 mm; of others, 48 mm.

Size, grams .....	10	20	50	100	500
Each .....	.35	.40	.50	.80	.85

796. **WEIGHT HOLDER**, only, of No. 792. Useful for holding No. 794 weights..... .80

## BALANCE ACCESSORIES

810. **BALANCE BRACKET** or support, with drawer and key, for attachment to wall where it will be out of the way and less exposed to vibrations. Size of top surface, 60 x 35 cm, with raised edge ..... 10.00

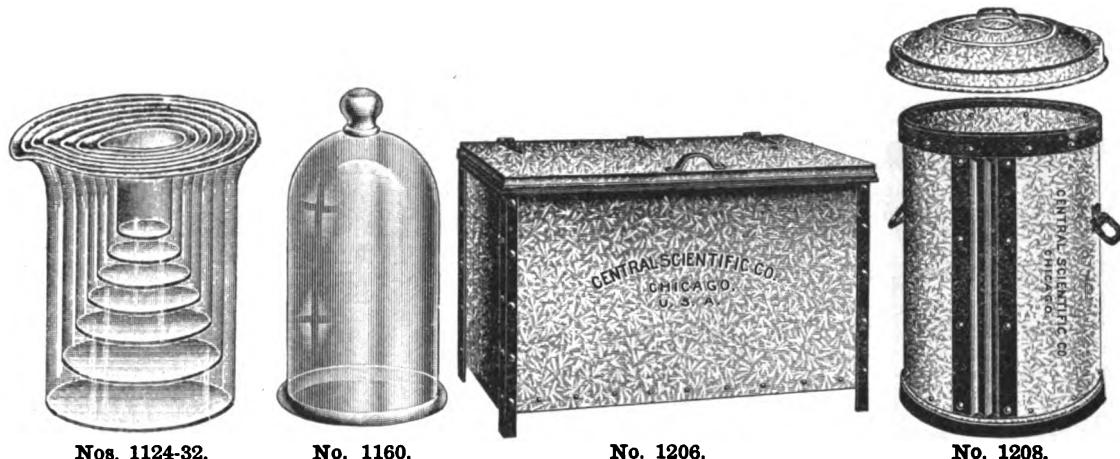
812. **BALANCE COVER**, of good quality rubber cloth. A very convenient protection to balances. Made to order to fit any balance. When ordering, please give extreme outside dimensions of balance case. Price, according to size, from ..... 3.00 to 3.50

822. **BALANCE RESTS**, glass, to place under the leveling screws of balances..... Each .15

838. **FORCEPS**, for use with sets of weights; brass with curved points; ivory tipped, heavily lacquered ..... 1.60

840. **FORCEPS**, of brass. Same as No. 838, without ivory tips..... .30

842. **WEIGHT BLOCK**, of polished wood, with sliding cover, empty, with separate compartments for holding fractional weights No. 748. Convenient for placing in balance case..... 1.00



## BEAKERS

### 1124. BEAKERS, Resistance Grade, Griffin's low form, with lip.

Capacity, cc.....	30	60	90	120	150	180	250	300
Number in original case.....	216	216	156	156	156	168	168	168
Each .....	\$ 0.12	.12	.13	.14	.15	.16	.17	.18
Per original case.....	23.33	23.33	18.26	19.66	21.07	24.20	25.72	27.24
Capacity, cc.....	350	400	500	600	700	800	1000	1400
Number in original case.....	84	84	84	72	72	48	48	24
Each .....	.21	.22	.25	.26	.30	.34	.40	.55
Per original case.....	15.88	16.64	18.90	16.85	19.44	14.69	17.28	.82

### 1132. BEAKERS, Pyrex Glass, Griffin's low form, with lip.

Capacity, cc.....	50	100	150	250	400	600	800
Number in original case.....	216	156	156	168	84	72	48
Each .....	.18	.19	.21	.25	.30	.35	.40
Per original case.....	35.00	26.68	29.49	37.80	22.68	22.68	17.28
Capacity, cc.....	1000	1300	1500	2000	2500	3000	4000
Number in original case.....	48	24	24	12	12	10	10
Each .....	.54	.65	.73	.98	1.20	1.40	1.80
Per original case.....	23.33	14.04	15.77	10.59*	12.96*	12.60*	16.20*

\*Boxing charged at manufacturer's cost.

### 1144. BEAKERS, Aluminum, with lip. Capacity, cc.....

Each .....	.60	.90	1.25	1.50
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### 1146. BEAKERS, Copper, with lip. Capacity, cc.....

Each .....	.80	1.10	1.50	1.75
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### 1160. BELL JARS, High Straight Form, Knob Top, with reground rim.

No. ....	A	B	C	D	E
Height, inside, inches.....	9	11	15	15	18
Diameter, inside, inches.....	5	6	7	8½	9
Capacity, gallons .....	½	1	2	3	4
Each .....	1.80	2.75	3.15	4.00	5.60

## BINS and CONTAINERS

### 1206. BIN or Container, strongly made of heavy galvanized steel with hinged cover and with angle steel reinforcements and legs, the bottom of the can being 4 inches from the floor. Size 22 inches by 30 inches high.....

24.00

### 1208. BINS or Containers, made of galvanized iron, air and water-tight, with outside fitting cover; has a heavy steel band top and bottom, the lower one riveted through body and bottom; concave bottom raised 1¼ inches from ground; drop handles.

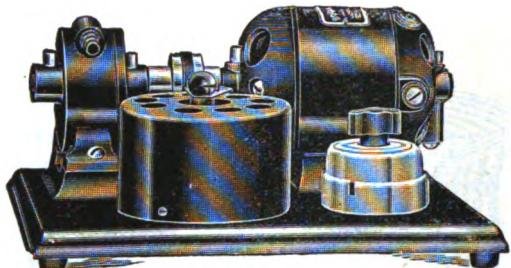
No. ....	A	B	C
Size, inches.....	14½x24	16x26	19x28
Capacity, gallons.....	17	22	32
Each .....	5.40	6.00	7.20



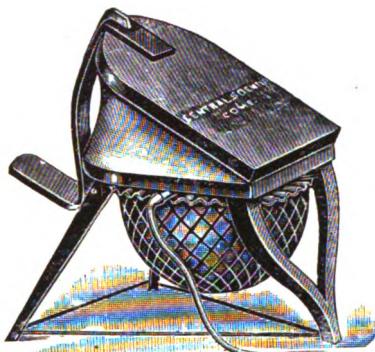
No. 1210.



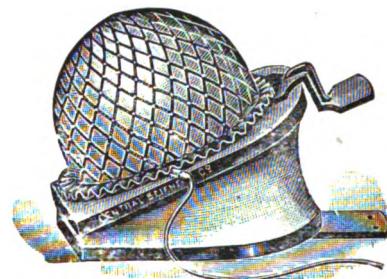
No. 1212.



No. 1398.



No. 1376.



No. 1374.

1210. **BINS or Containers**, of galvanized steel fitted with wheels and handles for wheeling about. Very convenient in transporting soils or grains from one part of the laboratory to another.  
With cover. No. .... A B  
Size, inches..... 16x26 19x28  
Capacity, gallons..... 22 32  
Each ..... \$8.00 9.60

1212. **BIN or Container**, of heavy galvanized iron, with handles and cover; will hold half-bushel of soil or grain..... 1.90

1374. **BLOWERS**, Foot, Fletcher's, portable; give a steady and powerful blast.  
No. .... 9 9A 9B  
Diameter of air reservoir, inches..... 7 $\frac{1}{4}$  9 11  
Capacity, per hour, cubic feet..... 190 330 625  
Each ..... 8.00 10.00 17.00

1376. **BLOWERS**, Foot, Fletcher's, mounted on legs with rubber reservoir underneath, thus obviating the risk of injury. Specifications are same as given under No. 1374.  
No. .... 10 10A 10B  
Each ..... 9.50 13.00 18.00

1377. **RUBBER DISKS** for Nos. 1374 and 1376 Blowers. No. A B C  
Adapted to Nos. .... 9 & 10 9A & 10A 9B & 10B  
Diameter, inches..... 9 $\frac{1}{4}$  11 $\frac{1}{2}$  14 $\frac{1}{4}$   
Each ..... .50 .70 1.00

1378. **NETS** for Nos. 1374 and 1376 Blowers. No. .... A B C  
Each ..... .50 .60 .75

1308. **BLOWER AND VACUUM PUMP**, Cenco Rotary, Electrically Driven, for producing a blast for the operation of blast lamps and for use with other laboratory devices requiring moderate air pressure or vacuum. The blowers are of small size, very compact, and with few parts. They are free from mechanical troubles and require practically no attention, except an occasional oiling. They are mounted on a cast iron base, direct connected to an electric motor, and are connected with a variable rheostat by means of which the speed and therefore the air pressure can be varied. A snap switch is mounted on the same base for starting and stopping the motor.

**Specifications:**Size of base, 8 $\frac{3}{4}$  x 8 inches.

Number of blast lamps operated simultaneously, 2.

Height over all, 4 $\frac{1}{4}$  inches.

Vacuum at maximum speed, 17 inches of mercury.

Range of speed, 600 to 2000 r. p. m.

Power consumption, 50 watts.

Pressure at maximum speed, 8 pounds per square inch.

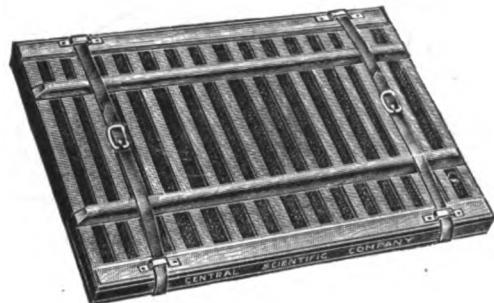
Cubic feet of air per minute, 0.75.

Complete as described with blower, motor, rheostat and snap-switch mounted on base with 5 feet of cord and plug for attachment to any lamp socket.

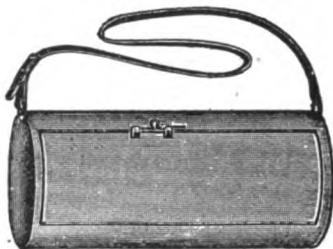
No. ....	A	B	C	D
	A.C.			D.C.
For volts .....	110	220	110	220
Each .....	40.00	45.00	40.00	45.00



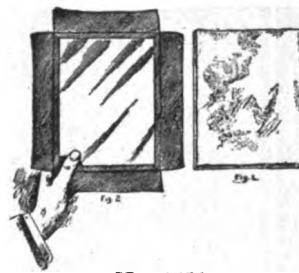
No. 1536.



No. 1558.



No. 1538.



No. 1556.

### BOTANICAL APPARATUS

1530. **BOTANICAL ABSORPTION PAPER**, 11x16 inches, as used in No. 1558 Plant Press. Heavy felt paper, very absorbent..... per 100 sheets \$3.00

1532. **BOTANICAL ABSORPTION PAPER**, good quality blotting paper, size, 12x19 inches..... per 100 sheets 2.00

1533. **BOTANICAL ABSORPTION PAPER**, same as No. 1532, but in sheets 19x24 inches..... per 100 sheets 3.50

1536. **BOTANICAL ADHESIVE TAPE**, in rolls of 10 yards,  $\frac{3}{4}$  inch wide, gummed, ready for use. Made of white cloth, easily cut and readily applied, presenting a neat and inconspicuous appearance on the mounting sheet. In box with slot enabling it to be withdrawn in any amount ..... per roll .45

**BOTANICAL CHARTS**, see general heading Charts.

1538. **BOTANICAL COLLECTING CASE** (Vasculum), of metal, finely enameled in green, with door opening entire length. Size  $15\frac{1}{4} \times 5 \times 7\frac{1}{2}$  inches. Complete with leather shoulder strap and snaps ..... 2.00

1540. **BOTANICAL GENUS COVERS**, of heavy manila paper, with surface specially prepared for writing upon. Size folded, 12x18 inches..... per 100 sheets 3.50

1548. **BOTANICAL MOUNTING BOARD**, good quality Bristol board, plain. Size, 11x17 inches..... per 100 sheets 3.50

1549. **BOTANICAL MOUNTING BOARD**, same as No. 1548, but with printed form for plant description. Size, 11x17 inches..... per 100 sheets 5.00

1552. **BOTANICAL MOUNTING PAPER**, of heavy unsized stock, strong and durable. Color does not deteriorate with age. Size, 11x17 inches..... per 100 sheets 1.80

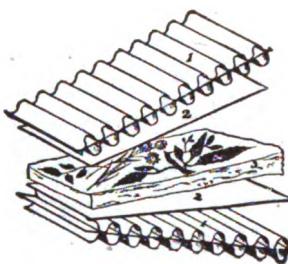
1554. **BOTANICAL MOUNTING PAPER**, heavy weight paper of grayish color, unsized surface. Size 11x17 inches..... per 100 sheets 1.10

1556. **BOTANICAL MOUNTS**, Riker's, suitable for mounting any botanical specimen. The mount consists of two parts—a thin plate of photographic glass to which narrow flaps of linen morocco paper are neatly fastened, and a cardboard back to which is glued a thin layer of sterilized surgical cotton in which the specimens are imbedded.

No.	A	B	C	D
Size, inches	5x6	$6\frac{1}{2} \times 8\frac{1}{2}$	8x12	12x16
Each	.25	.30	.50	1.00
Per dozen	2.80	3.50	6.00	12.00

For other MOUNTS, see Specimen Mounts.

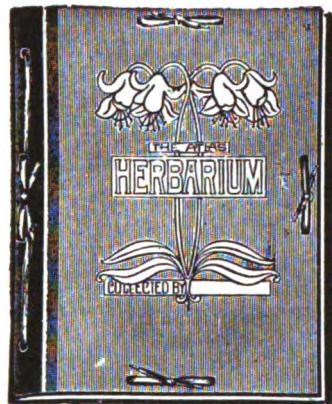
1558. **BOTANICAL PLANT PRESS**, simple, strong, portable, and satisfactory. Made of lattice work, it dries very rapidly, especially when used with No. 1530 Absorption Paper. Hung in sunlight or over a heater, specimens can be dried so rapidly as to preserve natural colors. From one to fifty or more specimens may be pressed at one time. Size,  $11\frac{1}{2} \times 16\frac{1}{2}$  inches. Complete with straps as illustrated..... 3.00



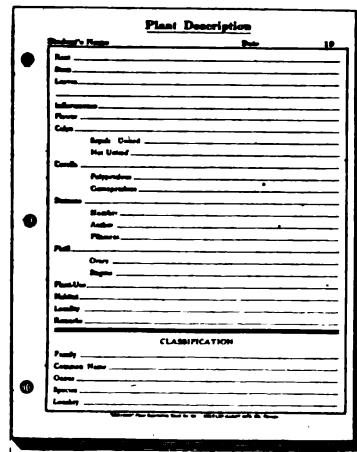
No. 1560, Fig. 1.



No. 1560, Fig. 2.



No. F8841.



No. F8847.

1560. **BOTANICAL PLANT PRESS**, Riker's, consisting of a series of layers of tubular paper inserted between sheets of blotting paper and absorbent cotton so that all the moisture is freely carried off by a current of hot air passing through the tubes. Fig. 1 represents a section showing the plant laid on the cotton. Fig. 2. The method of confining the heat from a lantern by a wrapping of paper dries the plants in a few hours and is adapted for camp or the tropics. If hung above a burner or placed in the sun splendid results are also obtained. Directions for use accompany each press.

No. ....	A	B
Size, inches.....	9x12	12x19
Each .....	\$2.00	3.25

1562. **BOTANICAL PRESSING PAPER**, thin white absorbent paper, folded and cut, for use with No. 1530 Absorption Paper.....per 100 sheets .50

1564. **BOTANICAL SPECIES COVERS**, of manila paper, size folded,  $11\frac{1}{2} \times 17\frac{1}{2}$  inches.  
Per 100 sheets..... 1.50

**HERBARIUMS.** Made in two sizes,  $7\frac{3}{4} \times 9\frac{3}{4}$  inches, and  $11 \times 17$  inches, uniform in design with the Atlas Note Books. The portfolio form permits the specimens to be mounted scientifically according to the genus and species to which they belong. The plan also permits adding to or removing from the collection at any time. Hints on collecting, pressing and mounting specimens are found on inside cover pages. Each sheet contains a legend for classification, and an index is furnished.

No. ....	A	B
Atlas No. ....	709	1117
Size, inches .....	$7\frac{3}{4} \times 9\frac{3}{4}$	$11 \times 17$
Number of sheets.....	40	25

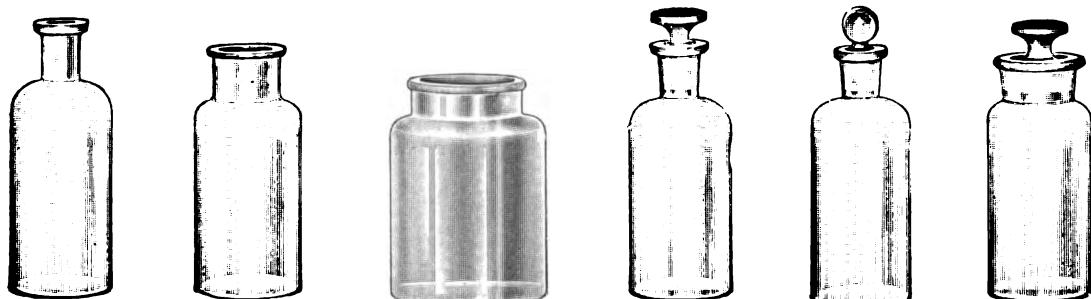
F8841. **HERBARIUM**, complete, as described above..... .32 .56

F8842. **HERBARIUM COVERS** only..... Per set .12 .20

F8843. **MOUNTING SHEETS** only..... Per 100 .42 1.40

F8847. **PLANT DESCRIPTION PAPER**, with spaces on one side for complete analysis of a plant; the other side unruled.  $7\frac{3}{4} \times 9\frac{3}{4}$  inches, perforated for Nos. F8811 or F8842A Covers. In envelope of 20 sheets ..... Per envelope .08

For other **SCIENCE TABLETS**, see **Note Books**.



No. 1574.

No. 1578.

No. 1582.

No. 1584.

No. 1592.

No. 1594.

**1574. BOTTLES, narrow mouth, round, flint glass.**

Capacity, ounces .....	$\frac{1}{2}$	1	2	4	6	8	12	16	32	64
To take cork stopper, No. ....	1	1	2	3	4	5	5	6	7	9
Number in original case....	864	864	720	432	360	288	216	144	96	48
Per dozen .....	\$0.58	.62	.68	.94	1.08	1.24	1.60	1.78	2.70	5.00
Per gross .....	5.50	5.90	6.50	9.00	10.30	11.80	15.20	17.00	25.80	48.40

**1576. BOTTLES, narrow mouth, round, green glass.**

Capacity, gallons .....	$\frac{1}{2}$	1	2	5
To take cork stopper, No. ....	10	12	15	19
Number in original case....	48	24	12	6
Each .....	.30	.48	1.60	3.00
Per dozen .....	2.80	4.40	18.00	31.20

**1578. BOTTLES, wide mouth, round, flint glass.**

Capacity, ounces .....	$\frac{1}{2}$	1	2	4	6	8	12	16	32	64
To take cork stopper, No. ....	7	8	12	14	14	18	18	20	28	..
To take rubber stopper, No. ....	3	4	5	6	7	8	8	9	11	13
Number in original case....	864	864	720	432	360	288	216	144	96	48
Per dozen .....	.60	.65	.70	1.00	1.15	1.30	1.68	1.84	2.80	5.15
Per gross .....	5.70	6.10	6.70	9.50	10.70	12.20	16.00	17.80	26.70	49.40

**1580. BOTTLES, wide mouth, round, green glass.**

Capacity, gallons .....	$\frac{1}{2}$	1	2	5
Number in original case....	36	24	12	6
Each .....	.35	.55	1.90	3.10
Per dozen .....	3.20	5.00	18.00	30.00

**1582. BOTTLES, extra wide mouth, round, flint glass.**

Capacity, ounces .....	1	2	3	4	6	8
Diameter of body, inches.....	$1\frac{1}{16}$	$1\frac{7}{8}$	$2\frac{3}{16}$	$2\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{3}{4}$
Diameter of neck, inside, inches.....	1	$1\frac{7}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{1}{8}$
To take rubber stopper, No. ....	5	6	6	9	9	9
Height over all, inches.....	2	$2\frac{1}{8}$	$2\frac{3}{16}$	$2\frac{1}{4}$	$3\frac{5}{16}$	$3\frac{3}{8}$
Number in original case....	720	720	576	432	360	288
Per dozen .....	.94	1.08	1.23	1.45	1.67	1.90
Per gross .....	9.00	10.30	12.20	14.00	16.00	18.30

**1584. BOTTLES, tincture, flint glass, mushroom stopper.**

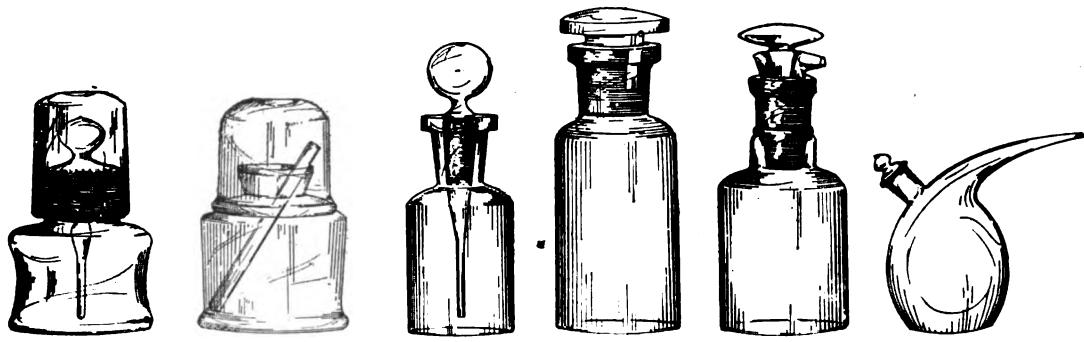
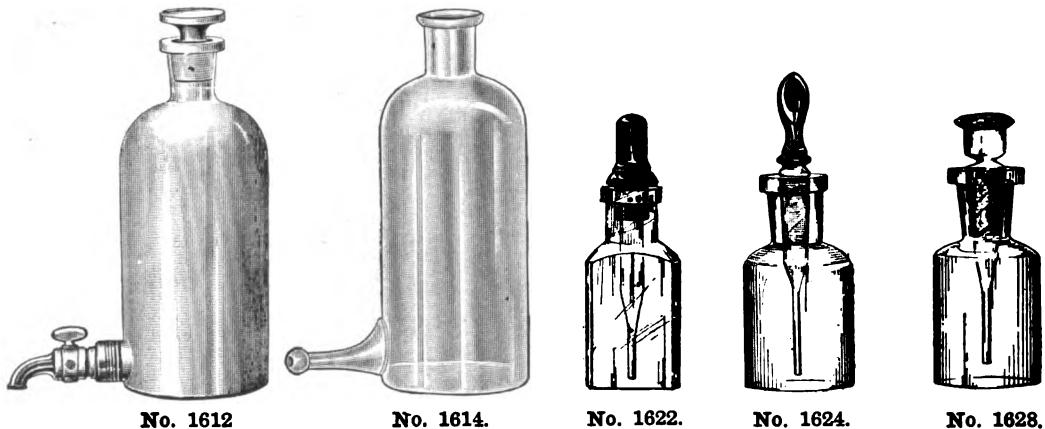
Capacity, ounces .....	1	2	4	8	16	32
Number in original case....	720	720	432	288	144	72
Per dozen .....	1.97	2.18	2.59	3.15	4.34	6.08
Per gross .....	18.90	21.04	24.98	30.26	41.63	58.16
Capacity, gallons .....	$\frac{1}{2}$	1	2			
Number in original case....	48	36	12			
Each .....		1.18	1.76			3.83
Per dozen .....		11.25	16.88			36.56

**1592. BOTTLES, narrow mouth, green glass, with vertical stopper, for acids.**

	pints		gallons		
	1	2	$\frac{1}{2}$	1	2
Capacity .....	1	2	$\frac{1}{2}$	1	2
Number in original case....	72	72	36	24	12
Each .....	.30	.45	.75	1.00	2.50
Per dozen .....	8.30	4.50	8.40	10.00	25.00

**1594. BOTTLES, salt mouth, flint glass, mushroom stopper.**

Capacity, ounces .....	1	2	4	8	16	32
Number in original case....	720	720	432	288	144	72
Per dozen .....	2.02	2.23	2.70	3.21	4.39	6.36
Per gross .....	19.35	21.26	25.54	31.29	42.52	61.42
Capacity, gallons .....	$\frac{1}{2}$	1	2			
Number in original case....	48	48	48			
Each .....		1.07	2.25			4.50
Per dozen .....		10.70	22.50			45.00



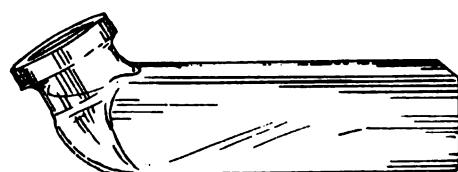
1610. <b>BOTTLES, Aspirator,</b> of heavy glass, with tubulation at bottom.					
No. ....	A	B	C	D	E
Capacity, gallons .....	1/2	1	2	3	5
Each .....	\$2.00	3.25	5.80	9.00	13.00
1612. <b>BOTTLES, Aspirator,</b> of heavy glass, with glass stopper and glass stopcock ground in tubulation.					
Capacity, ounces .....		8	16	32	
Each .....		3.50	4.00	4.50	
Capacity, gallons .....	1/2	1	2	3	5
Each .....	6.00	7.00	15.00	17.00	21.00
1614. <b>BOTTLES, Aspirator,</b> of heavy glass, with narrow outlet for connecting rubber tubing.					
Capacity, ounces .....	4	8	16	32	
Each .....	.60	.70	.90	1.10	
Capacity, gallons .....		1/2	1	2	
Each .....		1.75	2.40	3.80	
1618. <b>BOTTLE, Balsam,</b> with glass cap, and loosely fitting glass dropper. Capacity, 30 cc.....					.40
1620. <b>BOTTLE, Balsam,</b> wide mouth, with glass rod and glass cap ground to fit against shoulder of bottle. Capacity, 30 cc.....					.50
1622. <b>BOTTLE, Dropping,</b> with Barnes' pipette stopper, square shape. Capacity, 30 cc.....					.10
1624. <b>BOTTLES, Dropping,</b> with ground in pipette, with rubber bulb.					
Capacity, cc.....		15	30	60	
Each .....		.35	.38	.40	
1628. <b>BOTTLES, Dropping,</b> with ground in thistle top pipette, with rubber cap to control delivery.					
Capacity, cc.....		15	30	60	
Each .....		.30	.40	.45	
1630. <b>BOTTLES, Dropping, Rauvier's,</b> with ball top pipette ground in.					
Capacity, cc.....			30	60	
Each .....			.75	.90	
1634. <b>BOTTLES, Dropping, "TK",</b> with grooved flat glass stopper.					
Capacity, cc.....	15	30	50	100	200
Each .....	.33	.33	.40	.45	.50
1638. <b>BOTTLES, Dropping, "TK",</b> with grooved vertical stopper.					
Capacity, cc.....		30	50	100	
Each .....		.33	.40	.45	
1640. <b>BOTTLE, Dropping, Schuster's,</b> with ground-in glass stopper. Capacity, 30 cc.....					.60
1641. <b>BOTTLE, Dropping, Schuster's,</b> without stopper. Capacity, 30 cc.....					.40



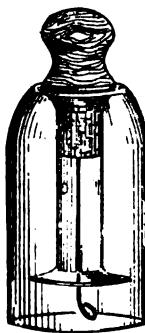
No. 1645.



No. 1650.



No. 1654.



No. 1648.



No. 1756.



No. 1758.



No. 1712.



No. 1718.



No. 1720.

## 1644. BOTTLES, Homeopathic Vials, long form.

	1	2	3	4	6	8
Capacity, drams.....	1	2	3	4	6	8
Dimensions, mm.....	63x11	75x12	90x14	90x17	105x19	120x20

Per gross.....

\$1.75

2.00

2.80

4.00

5.00

6.00

## 1645. BOTTLES, Homeopathic Vials, short form.

	1	2	3	4	6	8
Capacity, drams.....	1	2	3	4	6	8
Dimensions, mm.....	42x14	58x16	64x19	68x20	80x22	83x24

Per gross.....

1.75

2.00

2.80

4.00

5.00

6.00

## 1648. BOTTLE, Immersion Oil, unspillable, with wooden stopper and wire dropper..... .65

## 1650. BOTTLE, Immersion Oil, with nickel-plated cap, which cannot gum, and device for regulating amount of oil on plunger..... .90

## 1654. BOTTLES, Insect, bent neck.

	1/2	2
Capacity, ounces.....	1/2	2

Per dozen.....

1.10

1.80

## 1656. BOTTLE, Insect, cyanide, for collecting and killing, 4 ounce, ready for use..... .25

## 1712. BOTTLES, Screw-Cap Vials, with aluminum screw cap.

	1	2	4	8	12
Capacity, drams.....	1	2	4	8	12
Dimensions, inches.....	1 1/4 x 5/8	2 3/8 x 5/8	2 5/8 x 3/4	3 1/2 x 7/8	5 1/2 x 7/8

Per dozen.....

.35

.40

.60

.90

1.25

## 1718. BOTTLES, Shell Vials, round, straight wall.

No.	1	2	3	4	5
Height, mm.....	50	60	70	80	75
Diameter, mm.....	12	13	15	16	25
Capacity, cc.....	4	7	11	14	34
Per dozen.....	.25	.27	.28	.33	.50
Per gross.....	2.00	2.50	2.75	3.00	4.50

## 1720. BOTTLES, Show, Inverted, for storing and exhibiting sample grains, chemicals, etc.

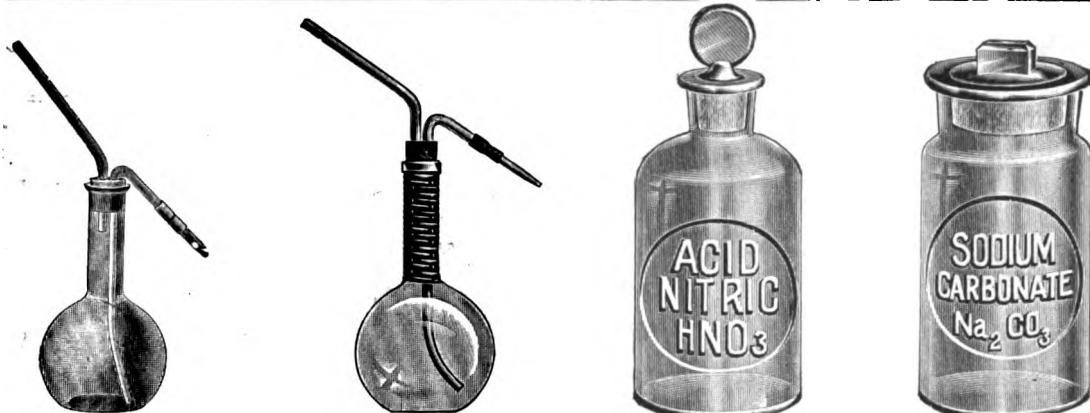
	1/8	1/4	1/2	1	2	4	8
Capacity, pints.....	1/8	1/4	1/2	1	2	4	8
Height, inches.....	3 3/4	4 3/8	6	7 3/4	9	11	14
Diameter, inches.....	1 1/2	2	2 1/2	2 3/4	3 1/2	4 1/4	5 1/4
Each .....	.25	.30	.35	.45	.60	1.10	2.00

## 1756. BOTTLES, Specimen or Sample, of glass, round, with cork-lined aluminum screw-caps.

	1	2	4	8
Capacity, ounces.....	1	2	4	8
Height, inches.....	3 1/8	3 3/4	4 3/4	4 11/16
Diameter, inches.....	1 1/8	1 1/2	1 7/8	2 1/2
Per dozen.....	.85	.90	1.20	1.65

## 1758. BOTTLES, Specimen or Sample, of glass, square, with cork-lined aluminum screw-caps.

	1	2	4	8
Capacity, ounces.....	1	2	4	8
Height, inches.....	2 1/2	3 13/16	4 1/2	5 1/16
Side, inches.....	1 3/8	1 1/2	1 13/16	2 1/8
Per dozen.....	.85	.90	1.20	1.65



No. 1766.

No. 1768.

No. 1674.

No. 1690.

1766. BOTTLES, Washing, with heavy neck, fitted with rubber stopper and movable delivery tube.	Capacity, ounces .....	8	12	16	24	32	64
	Each .....	\$0.50	.55	.60	.65	.70	1.30
1768. BOTTLES, Washing, of Pyrex glass, with neck covered with wicker, for use with hot water.	Capacity, ounces .....				16	32	
	Each .....				1.10	1.30	

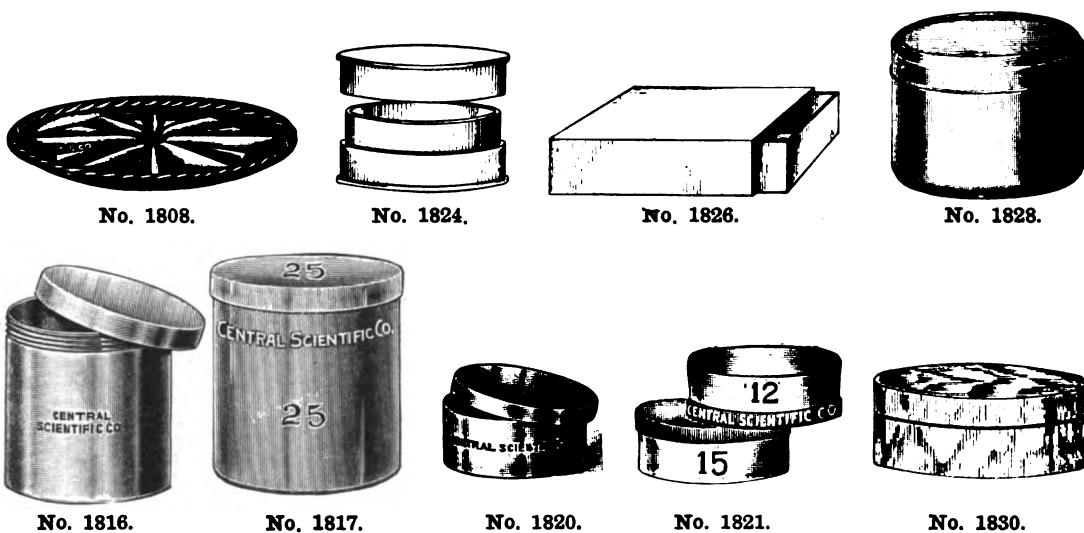
**BOTTLES FOR REAGENTS**

**BOTTLES, Reagent**, with raised letters with surfaces ground. Only those bottles with labels listed below are manufactured.

**PLEASE ORDER BY BOTTLE NUMBER.**

1672. BOTTLES, Reagent, narrow mouth, 1 oz., height 3½ inches.....	Per dozen	1.60
No. 326. Cobaltous Nitrate.....Co(NO <sub>3</sub> ) <sub>2</sub>	No. 325. Silver Nitrate (Amber).....AgNO <sub>3</sub>	.
336. Gold Chloride .....AuCl <sub>3</sub>	341. Blank.	.
327. Platinic Chloride .....PtCl <sub>4</sub>		
1674. BOTTLES, Reagent, narrow mouth, 4 oz., height, 5¼ inches.....	Per dozen	2.40
3. Acetic Acid .....HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	24. Magnesium Sulphate .....MgSO <sub>4</sub>	
30. Alcohol .....C <sub>2</sub> H <sub>5</sub> OH	25. Mercuric Chloride .....HgCl <sub>2</sub>	
439. Ammonium Acetate .....NH <sub>4</sub> C <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	100. Mercuric Potassium Iodide.	
18. Ammonium Carbonate .....(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	86. Mercurous Nitrate .....HgNO <sub>3</sub>	
17. Ammonium Chloride .....NH <sub>4</sub> Cl	415. Methyl Alcohol .....CH <sub>3</sub> OH	
15. Ammonium Hydroxide .....NH <sub>4</sub> OH	411. Methyl Orange.	
82. Ammonium Molybdate .....(NH <sub>4</sub> ) <sub>2</sub> MoO <sub>6</sub>	435. Millon's Reagent.	
19. Ammonium Oxalate .....(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	88. Nessier's Solution.	
16. Ammonium Sulphide (Amber). (NH <sub>4</sub> ) <sub>2</sub> S	5. Nitric Acid .....HNO <sub>3</sub>	
31. Ammonium Sulphocyanide .....NH <sub>4</sub> CNS	422. Nitric Acid, Con.....HNO <sub>3</sub>	
97. Ammonium Sulphhydrate .....NH <sub>4</sub> HS	430. Nitric Acid, Dil.....HNO <sub>3</sub>	
33. Barium Carbonate .....BaCO <sub>3</sub>	425. Obermayer's Reagent.	
20. Barium Chloride .....BaCl <sub>2</sub>	93. Oxalic Acid .....H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	
32. Barium Hydroxide .....Ba(OH) <sub>2</sub>	423. Phenol .....C <sub>6</sub> H <sub>5</sub> OH	
401. Barium Nitrate .....Ba(NO <sub>3</sub> ) <sub>2</sub>	412. Phenolphthalein.	
437. Benedict Fehling Solution.	94. Picric Acid .....HC <sub>6</sub> H <sub>3</sub> (NO <sub>2</sub> ) <sub>3</sub> O	
436. Biuret Reagent.	37. Platinic Chloride .....PtCl <sub>4</sub>	
426. Bromine for Hypobromite.	8. Potassium Carbonate.....K <sub>2</sub> CO <sub>3</sub>	
406. Bromine Water.	96. Potassium Chromate .....K <sub>2</sub> CrO <sub>4</sub>	
21. Calcium Chloride .....CaCl <sub>2</sub>	18. Potassium Dichromate .....K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	
28. Calcium Hydroxide .....Ca(OH) <sub>2</sub>	11. Potassium Ferricyanide .....K <sub>3</sub> Fe(CN) <sub>6</sub>	
22. Calcium Sulphate .....CaSO <sub>4</sub>	6. Potassium Ferrocyanide .....K <sub>4</sub> Fe(CN) <sub>6</sub>	
83. Carbon Disulphide .....CS <sub>2</sub>	12. Potassium Hydroxide .....KOH	
433. Carbon Tetrachloride .....CCl <sub>4</sub>	10. Potassium Iodide .....KI	
407. Chloroform .....CHCl <sub>3</sub>	9. Potassium Sulphate .....K <sub>2</sub> SO <sub>4</sub>	
408. Cochineal.	7. Potassium Sulphocyanide .....KCNS	
409. Coralline.	28. Silver Nitrate (Amber).....AgNO <sub>3</sub>	
36. Cupric Sulphate .....CuSO <sub>4</sub>	404. Silver Sulphate .....Ag <sub>2</sub> SO <sub>3</sub>	
421. Dimethyl Glyoxime .....(CH <sub>3</sub> ) <sub>2</sub> C <sub>2</sub> (NOH) <sub>2</sub>	60. Sodium Acetate .....NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	
35. Ether .....(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	59. Sodium Carbonate .....Na <sub>2</sub> CO <sub>3</sub>	
58. Fehling's Solution.	416. Sodium Cobaltic Nitrile.	
29. Ferric Chloride .....Fe <sub>2</sub> Cl <sub>6</sub>	61. Sodium Hydroxide .....NaOH	
28. Ferrous Sulphate .....FeSO <sub>4</sub>	427. Sodium Hydroxide for Hypo- bromite .....NaOH	
2. Hydrochloric Acid .....HCl	14. Sodium Phosphate .....Na <sub>2</sub> HPO <sub>4</sub>	
419. Hydrochloric Acid, Con.....HCl	417. Sodium Thiosulphate .....Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	
429. Hydrochloric Acid, Dil.....HCl	81. Stannous Chloride .....SnCl <sub>2</sub>	
428. Hydrogen Peroxide .....H <sub>2</sub> O <sub>2</sub>	4. Sulphuric Acid .....H <sub>2</sub> SO <sub>4</sub>	
1. Hydrogen Sulphide (Amber). H <sub>2</sub> S	420. Sulphuric Acid, Con.....H <sub>2</sub> SO <sub>4</sub>	
87. Indigo Solution.	431. Sulphuric Acid, Dil.....H <sub>2</sub> SO <sub>4</sub>	
414. Iodine Solution.....I + KI	424. Tinct. Guaiac.	
27. Lead Acetate .....Pb(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	413. Turmeric.	
410. Litmus.	38. Blank.	
90. Magnesia Mixture.	56. Uranium Acetate .....UO <sub>2</sub> (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	
438. Magnesium Chloride .....MgCl <sub>2</sub>		

1676. BOTTLES, Reagent, 4 oz., set of 40	Reagent Bottles No. 1674, including the most common names used in the chemical laboratory: Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36, 59, 61, and 3 blanks.....	Per set \$8.00		
1678. BOTTLES, Reagent, 4 oz., set of 24	according to Fresenius, including Nos. 2, 3, 4, 5, 6, 7, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 25, 26, 27, 29, 32, 36, 59 and 61.....	Per set 4.80		
1680. BOTTLES, Reagent, 4 oz., set of 12	consisting of Nos. 1, 2, 3, 4, 5, 15, 16, 20, 23, 26, 27 and 61.....	Per set 2.40		
1682. BOTTLES, Reagent, narrow mouth, 8 oz., height, 6½ inches.....		Per dozen 3.00		
No.	No.			
131. Acetic Acid .....	HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	153. Mercuric Chloride .....	HgCl <sub>2</sub>	
126. Alcohol .....	C <sub>2</sub> H <sub>5</sub> OH	103. Nitric Acid, Con.....	HNO <sub>3</sub>	
110. Ammonium Carbonate .....	(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	104. Nitric Acid, Dil.....	HNO <sub>3</sub>	
109. Ammonium Chloride .....	NH <sub>4</sub> Cl	171. Potassium Carbonate .....	K <sub>2</sub> CO <sub>3</sub>	
108. Ammonium Hydroxide .....	NH <sub>4</sub> OH	160. Potassium Chromate .....	K <sub>2</sub> CrO <sub>4</sub>	
155. Ammonium Molybdate .....	(NH <sub>4</sub> ) <sub>6</sub> Mo <sub>7</sub> O <sub>24</sub>	172. Potassium Ferricyanide .....	K <sub>3</sub> Fe(CN) <sub>6</sub>	
130. Ammonium Oxalate .....	(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	173. Potassium Ferrocyanide.....	K <sub>3</sub> Fe(CN) <sub>6</sub>	
158. Ammonium Phosphate .....	(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub>	150. Potassium Hydroxide .....	KOH	
122. Ammonium Sulphide (Amber).....	(NH <sub>4</sub> ) <sub>2</sub> S	145. Silver Nitrate (Amber).....	AgNO <sub>3</sub>	
114. Barium Chloride .....	BaCl <sub>2</sub>	112. Sodium Carbonate .....	Na <sub>2</sub> CO <sub>3</sub>	
151. Calcium Hydroxide .....	Ca(OH) <sub>2</sub>	111. Sodium Hydroxide .....	NaOH	
159. Ether .....	(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	129. Sodium Phosphate .....	Na <sub>2</sub> HPO <sub>4</sub>	
154. Ferrous Sulphate .....	FeSO <sub>4</sub>	156. Stannous Chloride .....	SnCl <sub>2</sub>	
105. Hydrochloric Acid, Con.....	HCl	101. Sulphuric Acid, Con.....	H <sub>2</sub> SO <sub>4</sub>	
106. Hydrochloric Acid, Dil.....	HCl	102. Sulphuric Acid, Dil.....	H <sub>2</sub> SO <sub>4</sub>	
107. Hydrogen Sulphide (Amber).....	H <sub>2</sub> S	116. Blank.		
152. Lead Acetate .....	Pb(C <sub>2</sub> H <sub>5</sub> O <sub>2</sub> ) <sub>2</sub>			
1684. BOTTLES, Reagent, narrow mouth, 16 oz. (pint), height, 7¾ inches.....		Per dozen 4.30		
No.	No.			
239. Alcohol .....	C <sub>2</sub> H <sub>5</sub> OH	231. Hydrochloric Acid, Dil.....	HCl	
237. Acetic Acid .....	HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	228. Hydrodisodic Phosphate .....	Na <sub>2</sub> HPO <sub>4</sub>	
241. Ammonium Acetate .....	NH <sub>4</sub> CH <sub>3</sub> CO <sub>2</sub>	216. Nitric Acid .....	HNO <sub>3</sub>	
235. Ammonium Carbonate .....	(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	219. Nitric Acid, Con.....	HNO <sub>3</sub>	
234. Ammonium Chloride .....	NH <sub>4</sub> Cl	232. Nitric Acid, Dil.....	HNO <sub>3</sub>	
204. Ammonium Hydroxide .....	NH <sub>4</sub> OH	259. Potassium Bichromate .....	K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	
227. Ammonium Hydroxide, Dil.....	NH <sub>4</sub> OH + Aq	238. Potassium Chromate .....	K <sub>2</sub> CrO <sub>4</sub>	
258. Ammonium Oxalate .....	(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	221. Potassium Hydroxide .....	KOH	
229. Ammonium Sulphide, Dil.....	(NH <sub>4</sub> ) <sub>2</sub> S + Aq	240. Silver Nitrate (Amber).....	AgNO <sub>3</sub>	
236. Ammonium Sulphide (Amber).....	(NH <sub>4</sub> ) <sub>2</sub> S	260. Sodium Carbonate .....	Na <sub>2</sub> CO <sub>3</sub>	
218. Barium Chloride .....	BaCl <sub>2</sub>	233. Sodium Hydroxide .....	NaOH	
223. Calcium Hydroxide .....	Ca(OH) <sub>2</sub>	228. Sodium Hydroxide, Dil.....	NaOH	
225. Calcium Sulphate .....	CaSO <sub>4</sub>	215. Sulphuric Acid .....	H <sub>2</sub> SO <sub>4</sub>	
230. Ether .....	(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	242. Sulphuric Acid, Dil.....	H <sub>2</sub> SO <sub>4</sub>	
224. Ferrous Sulphate .....	FeSO <sub>4</sub>	220. Sulphuric Acid, Con.....	H <sub>2</sub> SO <sub>4</sub>	
217. Hydrochloric Acid .....	HCl	211. Blank.		
222. Hydrochloric Acid, Con.....	HCl			
1686. BOTTLES, Reagent, narrow mouth, 32 oz. (quart), height, 9½ inches.....		Per dozen 6.00		
No.	No.			
512. Ammonium Hydrate .....	(NH <sub>4</sub> )OH	501. Sulphuric Acid, Con.....	H <sub>2</sub> SO <sub>4</sub>	
505. Hydrochloric Acid, Con.....	HCl	502. Sulphuric Acid, Dil.....	H <sub>2</sub> SO <sub>4</sub>	
506. Hydrochloric Acid, Dil.....	HCl	511. Blank.		
503. Nitric Acid, Con.....	HNO <sub>3</sub>			
504. Nitric Acid, Dil.....	HNO <sub>3</sub>			
1688. BOTTLES, Reagent, wide mouth, 1 oz., height, 3½ inches.....		Per dozen 1.70		
No.	No.			
374. Ammonium Phosphate .....	(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub>	354. Potassium Nitrate .....	KNO <sub>3</sub>	
361. Ammonium Sodium Phosphate.NaNH <sub>4</sub> HPO <sub>4</sub>		372. Test Paper.		
351. Borax .....	Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub>	353. Sodium Acetate .....	NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	
364. Copper .....	Cu	369. Sodium Bitartrate .....	NaHC <sub>4</sub> H <sub>3</sub> O <sub>6</sub>	
365. Ferrous Sulphate .....	FeSO <sub>4</sub>	350. Sodium Carbonate .....	Na <sub>2</sub> CO <sub>3</sub>	
366. Ferrous Sulphide .....	FeS	370. Sodium Nitrate .....	NaNO <sub>3</sub>	
377. Phenyl Hydrazine .....	C <sub>6</sub> H <sub>5</sub> NH.NH <sub>2</sub>	376. Soda. Pot. Carbonate.....	Na <sub>2</sub> CO <sub>3</sub> , K <sub>2</sub> CO <sub>3</sub>	
367. Potassium Chlorate .....	KClO <sub>3</sub>	371. Starch.		
358. Potassium Cyanide .....	KCN	373. Zinc.		
368. Potassium Ferricyanide .....	K <sub>3</sub> Fe(CN) <sub>6</sub>	375. Blank.		
1690. BOTTLES, Reagent, wide mouth, 4 oz., height, 4¾ inches.....		Per dozen 2.75		
No.	No.			
314. Ammonium Sulphate .....	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	313. Sod. Am. Hyd. Phos.. Na(NH <sub>4</sub> )HPO <sub>4</sub> +4H <sub>2</sub> O		
304. Borax .....	Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub>	301. Sodium Carbonate .....	Na <sub>2</sub> CO <sub>3</sub>	
305. Ferrous Sulphate .....	FeSO <sub>4</sub>	312. Test Paper.		
303. Potassium Cyanide .....	KCN	307. Blank.		
302. Potassium Nitrate.....	KNO <sub>3</sub>			
1694. CAPS for reagent bottles.				
No.	A	B	C	D
For bottles of capacity, ounces.....	1 to 4	8	16	32
Height inside, inches.....		2½	2¾	2½
Diameter inside, inches.....		1½	1¾	2
Per dozen .....		1.50	1.65	2.00



1808. **BOTTLE REST**, Hard Rubber, for use under acid bottles, etc., for protecting table tops. Diameter inside,  $3\frac{3}{4}$  inches. Will take bottles up to 32 ounce or 1 liter..... \$0.20

1816. **BOXES**, Aluminum, with aluminum screw top,  $2\frac{3}{8}$  inches in diameter by  $2\frac{1}{2}$  inches high.  
Each .....

1817. **BOXES**, Aluminum, same as No. 1816, but with box and cover numbered. In ordering state what numbers are desired..... each .45

1820. **BOXES**, Aluminum, with aluminum top. The diameter of these boxes is uniform so that the cover fits the bottom of the box, making it possible to keep box and cover together while the box is open.

No. ....	A	B	C
Diameter, inches.....	.2	$2\frac{1}{2}$	$3\frac{1}{4}$
Height, inches.....	$\frac{7}{8}$	$1\frac{3}{4}$	2
Each .....	.40	.50	.65

1821. **BOXES**, Aluminum, same as No. 1820, but with box and cover numbered. In ordering state what numbers are desired.

No. ....	A	B	C
Diameter, inches.....	.2	$2\frac{1}{2}$	$3\frac{1}{4}$
Height, inches.....	$\frac{7}{8}$	$1\frac{3}{4}$	2
Each .....	.45	.55	.70

**BOXES**, Glass, see Jars, Sample.

1824. **BOXES**, Pasteboard, round, telescope form.

No. ....	A	B	C	D	E	F
Diameter, inches.....	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{16}$	$2\frac{7}{16}$	$2\frac{3}{4}$
Depth, inches.....	$\frac{7}{16}$	$\frac{9}{16}$	$1\frac{1}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Per dozen.....	.30	.32	.35	.55	.82	.85
Per gross.....	2.90	3.25	3.50	5.50	8.25	8.50

1826. **BOXES**, Pasteboard, rectangular, slide form, white.

No. ....	A	B	C
Length, inches.....	$2\frac{5}{16}$	$2\frac{9}{16}$	$2\frac{3}{4}$
Width, inches.....	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{15}{16}$
Depth, inches.....	$1\frac{11}{16}$	$1\frac{13}{16}$	$1\frac{15}{16}$
Per dozen.....	.25	.30	.35
Per gross.....	2.40	2.80	3.30

**BOXES**, Slide, see Slide Boxes.

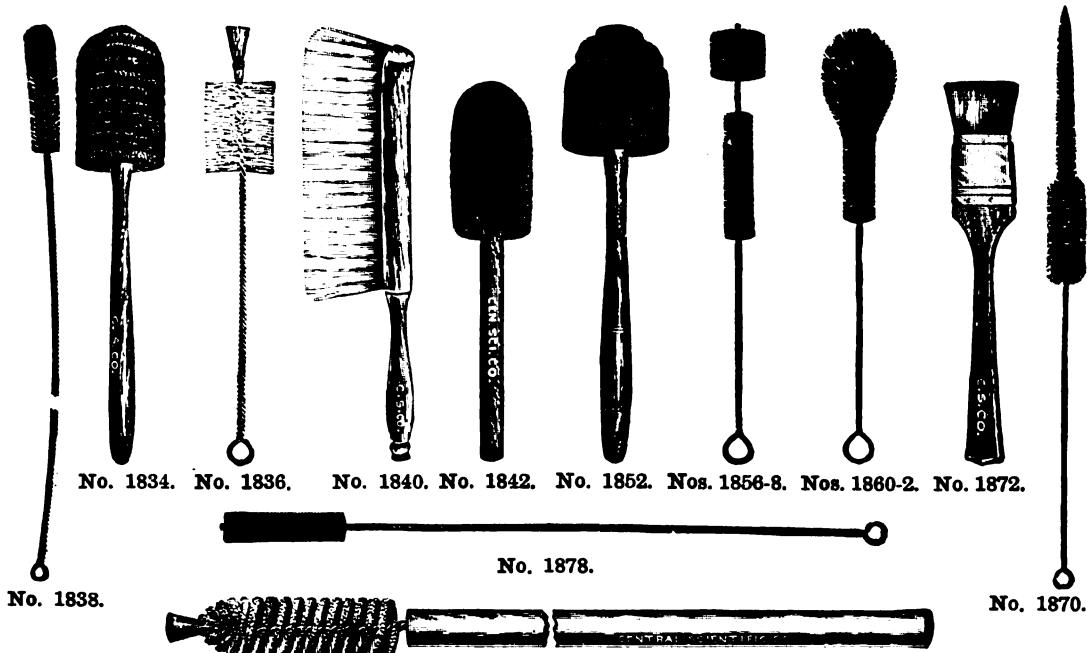
**BOXES**, Soil Sample, see Soil Analysis Apparatus.

1828. **BOXES**, Seamless Tin, round, very convenient for samples.

Capacity, ounces.....	$\frac{1}{2}$	1	2	4	8	16	24
Per dozen.....	.25	.30	.50	.75	1.10	1.75	2.25
Per gross.....	2.20	2.90	4.60	7.50	11.00	17.50	22.00

1830. **BOXES**, Turned Wood, plain, for samples.

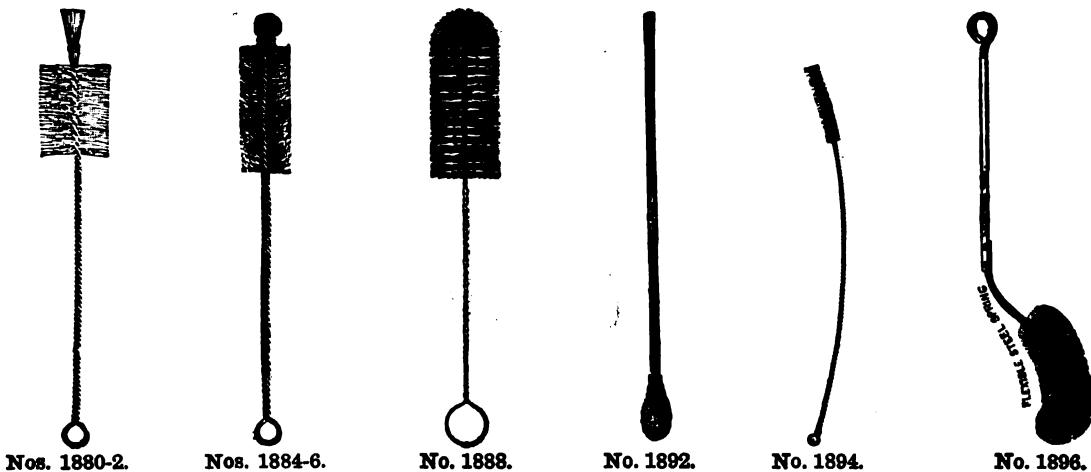
Capacity, ounces.....	$\frac{1}{2}$	1	2	4
Per dozen.....	.45	.60	.80	1.40
Per gross.....	4.30	5.80	8.00	14.00



## No. 1876.

## BRUSHES

1834. BRUSH, Beaker, with wood handle and black bristles. Length of bristle part, 3 inches; diameter, 2 inches; total length, 11½ inches.....		A	\$0.25
1836. BRUSHES, Bottle, bristle end, brass wire, white bristles.		B	
No. ....		A	
Total length, inches.....	12	B	20
Length of brush part, inches.....	4		5½
Diameter of brush part, inches.....	2¼		2¾
Each .....	.20		.30
1838. BRUSHES, Burette, tinned wire, white bristles. No. ....		A	B
For burettes, cc.....	10 & 25	50 & 100	
Total length, inches.....	24	36	
Length of bristle part, inches.....	3	3¾	
Diameter of bristle part, inches.....	½	¾	
Each .....	.10	.12	
1840. BRUSH, Counter Dusting, wooden handle, five rows unbleached bristles. Length of bristle part, 8 inches; width, 2½ inches; total length, 13¾ inches .....			.60
1842. BRUSH, Cylinder or Jar, with wooden handle and four rows black bristles. Length of bristle part, 5 inches; diameter, 2¾ inches; total length, 12 inches.....			.32
1852. BRUSH, Funnel, taper end, black bristle, wooden handle. Length of bristle part, 3 inches; diameter at large end, 2¾ inches; total length, 11¼ inches.....			.20
1856. BRUSHES, Milk Bottle, for bottles with necks not less than ¾ inch in diameter. Each	.08		
Per dozen	.80		
1858. BRUSHES, Milk Bottle, for bottles with neck not less than ¼ inch in diameter.. Each	.09		
Per dozen	.90		
1860. BRUSHES, Cream Bottle, for bottles with necks not less than ⅜ inch in diameter. Each	.12		
Per dozen	1.20		
1862. BRUSHES, Cream Bottle, for bottles with necks not less than ½ inch in diameter. Each	.12		
Per dozen	1.20		
1866. BRUSHES, Pencil, of camel's hair bound in quill. Size.....	small	medium	large
Per dozen	.20	.45	.50
1870. BRUSH, Pipette, for use in cleaning volumetric, Mohr's or milk pipettes.....			.15
1872. BRUSHES, Scale Pan, of camel's hair, wooden handle, metal bound. Length of hair, about 1 inch. Width of hair part, inches.....	½	1	1½
Each .....	.16	.22	.30
1876. BRUSH, Soil Percolation Tube, for cleaning tubes used in soil testing. Of unbleached bristles, with tufted end, and wooden handle. Length of bristle part, 7 inches; diameter, 2 inches; length over all, 3 feet 9 inches.....			.75
1878. BRUSH, Soil Sampling Tube, for cleaning tubes used in sampling soils. Of stiff vegetable fiber with strong twisted wire handle. Length of bristle part, 4½ inches; diameter, 1¾ inches; total length, 65 inches.....			.25



No. 1890.

1880. BRUSH, Test Tube, bristle end, brass wire. Length of bristle part over all,  $4\frac{1}{4}$  inches; diameter,  $1\frac{1}{8}$  inches; total length,  $10\frac{3}{4}$  inches..... Each \$0.09  
Per dozen .90

1882. BRUSH, Test Tube, same as No. 1880, but with tinned wire..... Each .07  
Per dozen .70

1884. BRUSH, Test Tube, sponge end, brass wire, for test tubes  $\frac{5}{8}$  inch or larger in diameter. Length of bristle part including sponge,  $3\frac{1}{2}$  inches; diameter,  $1\frac{1}{8}$  inches; total length, 11 inches. Each .09  
Per dozen .90

1886. BRUSH, Test Tube, same as No. 1884, but with tinned wire..... Each .08  
Per dozen .80

1888. BRUSH, Test Tube, tufted end, tinned wire. Length of bristle part,  $3\frac{1}{2}$  inches; diameter, 1 inch; total length, 10 inches. This brush is much superior to the ordinarily so-called tufted end brushes, in which the wire projects at the end making it impossible to clean the bottom of the test tube without breakage. Length of bristle part,  $3\frac{1}{2}$  inches; diameter,  $1\frac{1}{4}$  inches; total length,  $10\frac{1}{2}$  inches..... Each .05  
Per dozen .50

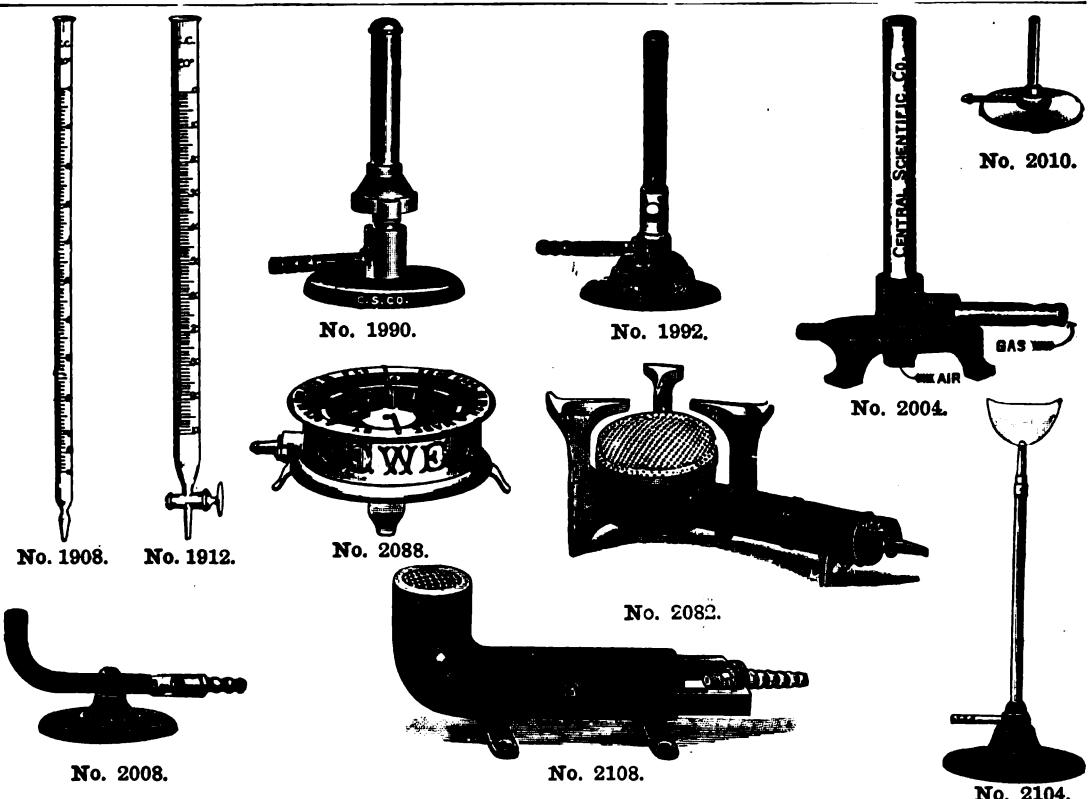
1890. BRUSHES, Test Tube, Dolbey's (Patented), with tuft of bristles so constructed as to reach all parts of tube, yet affording the most perfect protection to the tube from breakage by the wire end. This is the best test tube brush made and we heartily recommend it to laboratory workers who have been looking for something better than the old style brush with the constant annoyance from breakage or imperfect cleansing.

No.	A	B	C
Total length, inches.....	9	$13\frac{1}{2}$	$13\frac{1}{2}$
Length of bristle part, inches.....	$2\frac{1}{2}$	4	4
Diameter of bristle part, inches.....	$\frac{3}{4}$	1	$1\frac{1}{4}$
For test tubes, diameter, inches.....	$\frac{3}{8}$ to $\frac{1}{4}$	$\frac{5}{8}$ to $\frac{3}{4}$	1 or larger
Each .....	.08	.09	.10
Per dozen .....	.75	.90	1.00

1892. BRUSHES, Test Tube, Probangs, with rattan handle and sponge end. Length over all, 9 inches. Each .10  
Per dozen 1.00

1894. BRUSHES, Tube, for small tubes and funnel stems, of bristle on tinned wire. Length of bristle part, 2 inches; diameter,  $\frac{1}{2}$  inch; total length,  $12\frac{1}{2}$  inches..... Per dozen .35

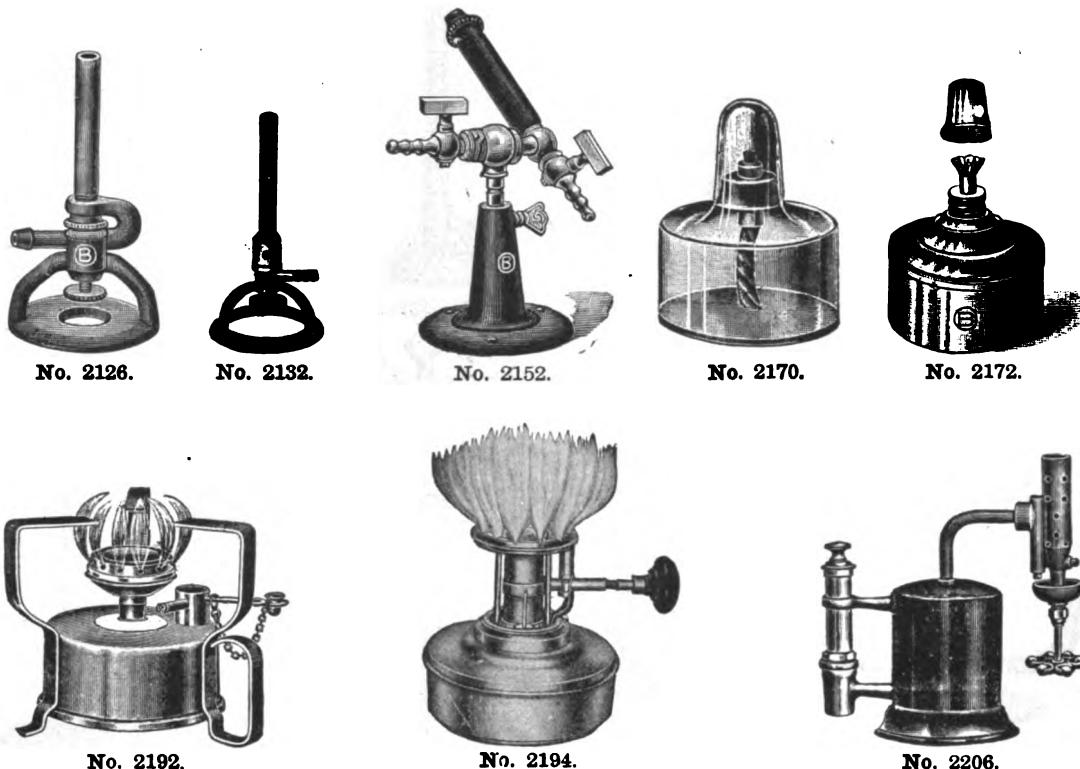
1896. BRUSHES, Volumetric Flask, with flexible steel spring enabling the brush to reach every part of flask. No..... A B C  
For flasks, capacity, cc..... 250 500 1000  
Each ..... .25 .30 .35



1908. <b>BURETTES</b> , for pinchcock, without fittings. Graduated in $\frac{1}{10}$ cc.					
Capacity, cc.....	10	25	50	100	
Each .....	\$0.45	.65	.90	1.40	
1912. <b>BURETTES</b> , with straight glass stopcock. Graduated in $\frac{1}{10}$ cc.					
Capacity, cc.....	10	25	50	100	
Each .....	1.40	1.70	1.90	2.75	

### BURNERS FOR GAS

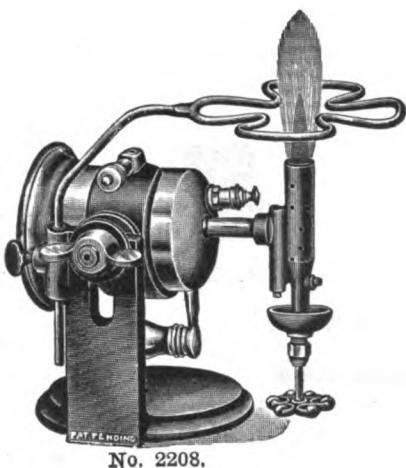
1990. <b>BURNER</b> , Bunsen, for acetylene gas. Height of burner, $5\frac{1}{2}$ inches; diameter of tube, $\frac{1}{16}$ inch .....	2.60
1992. <b>BURNER</b> , Bunsen, with air regulator and slot-shaped nipple which can easily be adjusted to suit the local conditions of gas pressure. Height, $5\frac{1}{2}$ inches; diameter of tube, $\frac{1}{16}$ inch. Finished in oxidized brass with japanned base.....	.45
2002. <b>BURNERS</b> , Bunsen, Central Draft, an excellent burner for elementary student use. Substances accidentally dropped in tube will fall through without clogging gas inlet. Height, $5\frac{1}{2}$ inches; diameter of tube, $\frac{1}{16}$ inch.....	.40
2004. <b>BURNER</b> , Bunsen, Central Draft, same as No. 2002, with air regulator. Height, $5\frac{1}{2}$ inches; diameter of tube, $\frac{1}{16}$ inch.....	.45
2006. <b>BURNER</b> , Bunsen, Central Draft, for use with gasoline gas, fitted with air regulator. Height, $5\frac{1}{2}$ inches; diameter of tube, $\frac{1}{16}$ inch.....	.60
2008. <b>BURNER</b> , Bunsen, low form, with air regulator. Length, $5\frac{1}{2}$ inches; height, 3 inches; diameter of tube, $\frac{1}{16}$ inch.....	.60
2010. <b>BURNER</b> , Bunsen, micro form, nickel-plated, 2 inches high, tube $\frac{1}{4}$ inch in diameter....	.70
2082. <b>BURNER</b> , Fletcher's Solid Flame, for quick heating of large surfaces. Diameter of flame surface, $4\frac{1}{4}$ inches; gas consumption per hour, 35 feet .....	2.50
2084. <b>BURNER</b> , Fletcher's Solid Flame, same as No. 2082, but for gasoline gas, with cap-nut regulator.....	4.00
2088. <b>BURNER</b> , Gas Stove, round portable, with cast iron top and base, and Russia iron body. Steel drip pan is beneath burner and top is raised. Total height, $4\frac{1}{4}$ inches; diameter, 9 inches .....	1.60
2090. <b>BURNER</b> , Gas Stove, same as No. 2088, with valve and air regulator for burning gasoline gas .....	4.60
2104. <b>BURNER</b> , Illuminating, for table illumination, glass bending, etc. Height, 12 inches....	2.90
2106. <b>BURNER</b> , Illuminating, similar to No. 2104, but with Welsbach burner and mica chimney, as used at the University of Chicago. Height, 10 inches from table to center of light....	3.80
2108. <b>BURNER</b> , Low Form, extra large, with gauze top. Height, 5 inches; diameter, $2\frac{1}{4}$ inches; extreme length, 14 inches. A valuable burner for use in heating sterilizers and incubators	3.10



2126. **BURNER, Boyce's Adjustable**, with improved regulator for air and gas. One of the best low priced burners for coal, gasoline, or natural gas, as the tube is stationary, permitting all burner attachments to be used with it to the best advantage ..... \$0.80  
 2132. **BURNER, Tirrell's**, substantially constructed, all of brass, with regulators for air and gas. Considered one of the best burners made for use with coal, natural or gasoline gas. Height, 6 inches; diameter of tube,  $\frac{7}{16}$  inch ..... 1.50  
     For **BURNER TUBING**, see page 147 (especially No. 11624).  
 2152. **BURNER, Blast**, Bunsen's style, with three interchangeable gas tips and with stop-cocks on gas and air inlet tube. An excellent lamp for ordinary laboratory use. Can be adjusted in height from 8 to 10 inches. **For coal gas only** ..... 6.50

### BURNERS FOR LIQUID FUELS

2170.	<b>BURNERS, Alcohol Lamps</b> , of glass, with ground cap, wick and wick holder.			
	Capacity, ounces .....	4	8	
	Each .....	.26	.36	
2172.	<b>BURNERS, Alcohol Lamps</b> , of brass, with screw cap, wick and wick holder.			
	Capacity, ounces .....	4	8	
	Each .....	.75	1.30	
2173.	<b>BURNER WICKS</b> , for alcohol burners Nos. 2170 and 2172.....	Per dozen	.15	
2174.	<b>BURNER WICK HOLDERS</b> , brass, for No. 2170 .....	Per dozen	.80	
2175.	<b>BURNER CAPS</b> , of glass, for No. 2170. No.....	A	B	
	For burner, ounces.....	4	8	
	Per dozen .....	1.00	1.00	
2192.	<b>BURNER, Alcohol Stove</b> , of brass nickel-plated, with invisible, indestructible wick. Very powerful, producing no smoke or odor. Weight, 8 ounces; capacity, 7 ounces.....	1.00		
2194.	<b>BURNER, Alcohol Stove</b> , as used on Moisture Testers; noiseless, economical and safe. Burns with intensely hot, blue, smokeless flame for three hours on one charge. The best alcohol stove substitute for a broad gas flame. Flame adjustable in height.....	3.50		
2206.	<b>BURNER, Laboratory Blast Lamp</b> , for gasoline. The tank is of heavy seamless drawn brass, with brass pump in handle; the burner is of special bronze alloy. The flame is intensely hot, and can be regulated from small point to large brush. An excellent substitute for the Bunsen burner or gas blast lamp. Capacity of adjustable tank, 1 pint; total height of burner, 7 inches .....	8.10		



No. 2208.



No. 2211A.



No. 2211B.



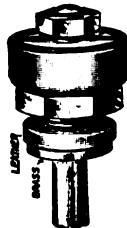
No. 2211H.



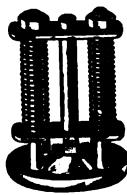
No. 2211D.



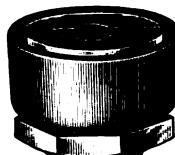
No. 2211G.



No. 2211S.



No. 2211U.



No. 2211V.

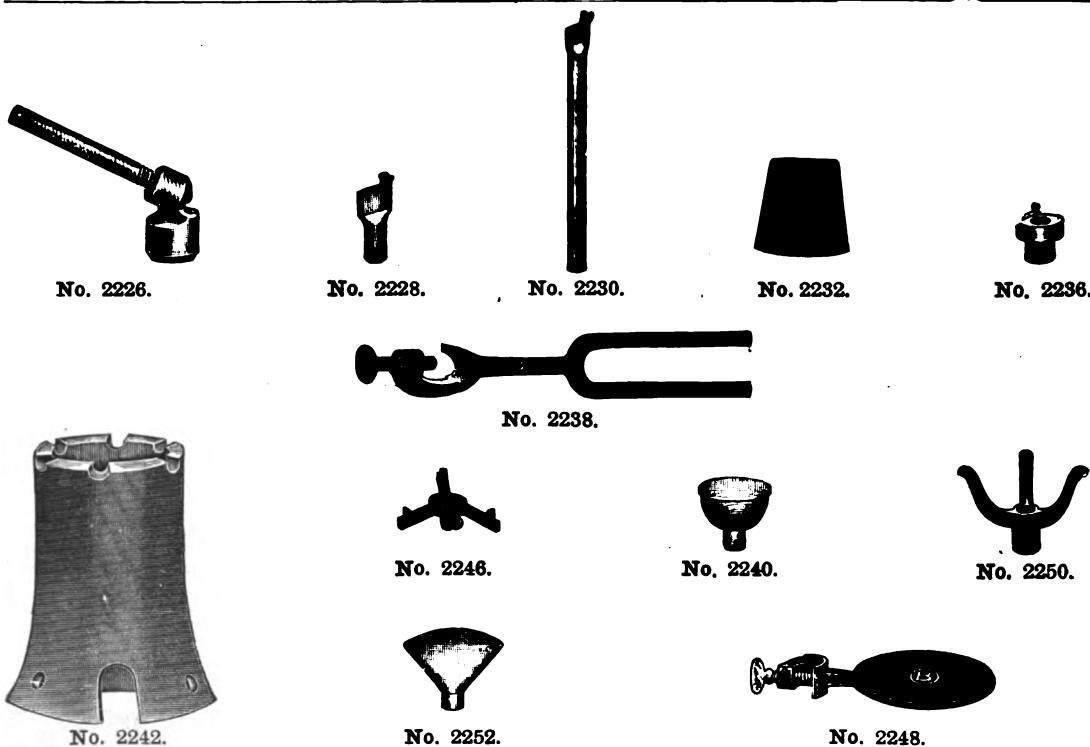


No. 2220.

2208. <b>BURNER</b> , Adjustable Laboratory Blast Lamp, for gasoline. Similar in construction to No. 2206, but mounted on swivel stand so that flame can be pointed in any direction, and raised or lowered. The pump is of brass mounted inside the tank and is automatic in action. Complete with adjustable tripod, which can be swung out of the way when not in use.....	\$12.00
2209. <b>BLAST LAMP</b> only of No. 2208.....	7.80
2210. <b>STAND</b> only of No. 2208.....	4.20

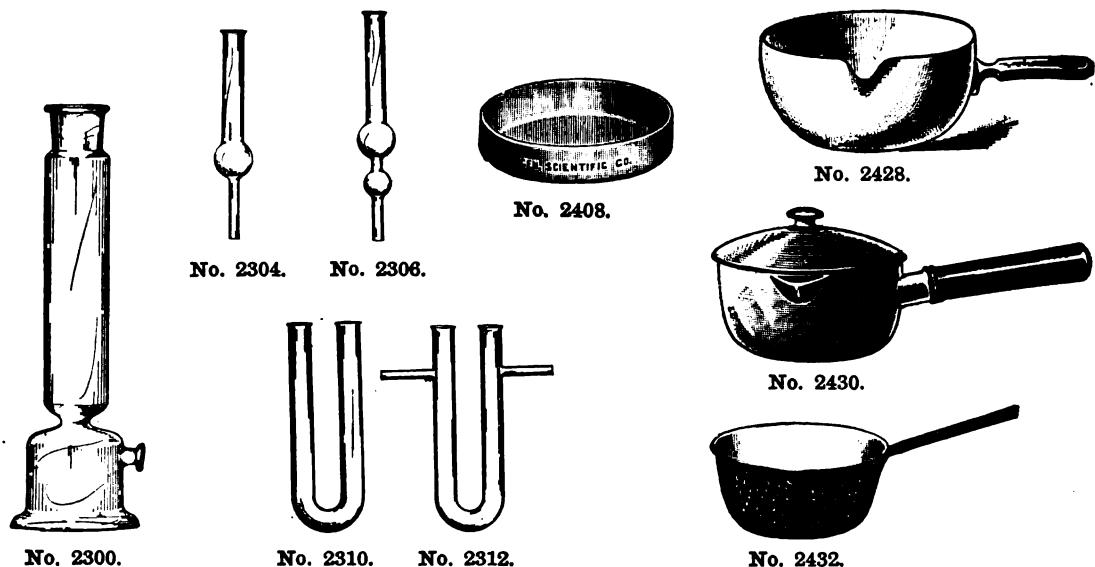
**REPAIR PARTS FOR Nos. 2206 AND 2208.**

2211A. Burner Body, Needle and Drip Cup, for either No. 2206 or No. 2208.....	3.80
2211B. Filler Plug for either No. 2206 or No. 2208.....	.44
2211C. Drip Cup for either No. 2206 or No. 2208.....	.70
2211D. Feed Pipe for No. 2206.....	.20
2211F. Pump for No. 2206.....	1.80
2211G. Pump for No. 2208.....	1.80
2211H. Cup Leathers for No. 2206 or No. 2208.....	Each .10
2211J. Hexagon Nuts, any size for No. 2206 or No. 2208.....	Each .08
2211K. Pump Caps for No. 2206 or No. 2208.....	Each .15
2211L. Plunger Knobs for No. 2206 or No. 2208.....	Each .15
2211M. Cork Washers for No. 2206 or No. 2208.....	Each .02
2211N. Springs for No. 2206 or No. 2208.....	Each .05
2211P. Cork Holder for No. 2206 or No. 2208.....	.05
2211Q. Spring Plates for No. 2206 or No. 2208.....	Each .15
2211R. Plunger Rod for No. 2206 or No. 2208.....	.15
2211S. Plunger Rod, complete with knob, cap and slide for No. 2206 or No. 2208.....	.75
2211T. Pump Collar for No. 2206 or No. 2208.....	.20
2211U. Pump Bottom for No. 2206 or No. 2208.....	.75
2211V. Pump Slide for No. 2206 or No. 2208.....	.35
2220. <b>BURNER</b> , Kerosene Stove, wickless, giving hot blue flame, without smoke or odor. Height, 8 $\frac{1}{4}$ inches; diameter of base, 9 inches. Without stand .....	6.00
2221. <b>STAND</b> for No. 2220, with top 8 $\frac{1}{4}$ inches in diameter .....	1.30



### BURNER ACCESSORIES

2226. <b>BURNER BLOWPIPE ATTACHMENT.</b> to fit on a $\frac{7}{16}$ inch burner tube. Takes the place of both blowpipe and blowpipe tip, leaving both hands free. Should be used with rubber tube and glass mouthpiece.....	<b>\$1.60</b>
2228. <b>BURNER BLOW PIPE TIP,</b> with rest, for blow pipe, fitting outside $\frac{7}{16}$ inch burners.....	.20
2230. <b>BURNER BLOW PIPE TUBE,</b> for yellow flame, fitting inside $\frac{7}{16}$ inch burners.....	.25
2232. <b>BURNER CHIMNEY,</b> of Russia iron, to protect flame from drafts, for use with No. 2246 Star Support. Diameter at bottom, 2 inches; at top, $1\frac{1}{2}$ inches; height, 2 inches.....	.20
2234. <b>BURNER CHIMNEYS,</b> of Russia iron, with attached support. No. ....	A
For burner tube, diameter, inches.....	B
Each .....	$\frac{7}{16}$
	.90
	.95
2236. <b>BURNER CROWN TOP,</b> giving round flame, for heating dishes; diameter, 1 inch.....	.55
2238. <b>BURNER FORK</b> for attaching burner to ring stand .....	.35
2240. <b>BURNER GAUZE TOP,</b> giving large round flame; diameter, $1\frac{1}{2}$ inches.....	.30
2242. <b>BURNER GUARD,</b> of vitrified earthenware for protecting a flame from drafts. Will also be found a rigid and convenient support, measuring 9 inches high, 8 inches diameter at base, 5 inches diameter at top. Provided with hole for rubber tubing and inlets for air to support combustion .....	.48
2246. <b>BURNER STAR</b> for supporting No. 2232 Chimney .....	.28
2248. <b>BURNER SUPPORTS,</b> of iron, with heavy screw for clamping on supports or tripods. No. ....	A
Diameter, inches.....	B
Each .....	$3\frac{1}{2}$
	5
	.35
	.75
2250. <b>BURNER TRIPODS</b> for holding dishes, measuring $2\frac{1}{2}$ inches between supporting points. No. ....	A
For burner tube, diameter, inches.....	B
Each .....	$\frac{7}{16}$
	.18
	.22
<b>BURNER TUBING,</b> see <b>Rubber Tubing.</b>	
2252. <b>BURNER WING TOPS</b> for use in bending glass tubing. No. ....	A
For burner tube, diameter, inches.....	B
Each .....	$\frac{7}{16}$
	.10
	.20



## 2300. CALCIUM CHLORIDE JARS, Drying Towers, on foot, with tubulation near bottom.

	8	10	12
Each .....	\$1.25	1.30	1.50

## 2304. CALCIUM CHLORIDE TUBES, one bulb, straight delivery tube.

Length to bottom of bulb, inches.....	4	6	8	10
Diameter of tube, inches.....	5/8	3/4	5/4	7/8
Each .....	.11	.15	.18	.22

## 2306. CALCIUM CHLORIDE TUBES, two bulbs, straight delivery tube.

Length to bottom of first bulb, inches.....	4	6	8	10
Diameter of tube, inches.....	5/8	3/4	5/4	7/8
Each .....	.12	.16	.20	.26

## 2310. CALCIUM CHLORIDE TUBES, U shape, plain.

Length, inches.....	4	6	8	10
Diameter of tube, inches.....	5/8	5/8	5/4	7/8
Each .....	.15	.25	.30	.50

## 2312. CALCIUM CHLORIDE TUBES, U shape, with side tubes.

Length, inches.....	4	6	8
Diameter of tube, inches.....	5/8	5/8	5/4
Each .....	.25	.30	.55

## 2408. CAPSULES, Best American Porcelain, as used in milk analysis, ash determination in flour, etc. With straight sides and flat bottom, glazed throughout. No.....

No.....	1	2	3	3A	4	4A	5	6	7
Capacity, cc.....	30	75	150	210	375	500	750	1250	2000
Outside diameter, mm.....	50	70	85	95	110	120	135	165	175
Each .....	.35	.40	.50	.70	.90	1.15	1.40	2.00	3.50

## 2428. CASSEROLES, Best American Porcelain, with lip and porcelain handle, glazed with exception of rim. No.....

No.....	1	2	3	3A	4	4A	5	6	7
Capacity, cc.....	125	250	375	500	750	1000			
Diameter, mm.....	90	105	110	120	152	172			
Each .....	.65	.75	1.00	1.25	2.00	2.50			

## 2430. CASSEROLES, Porcelain, lipped, with porcelain cover and wooden handle.

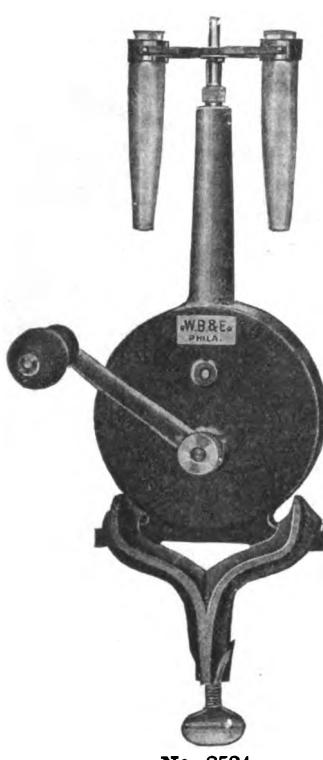
Capacity, cc.....	125	250	375	500	750	1000
Diameter, mm.....	90	105	110	120	152	172
Each .....	.65	.75	1.00	1.25	2.00	2.50

## 2432. CASSEROLES, Agateware, with handle.

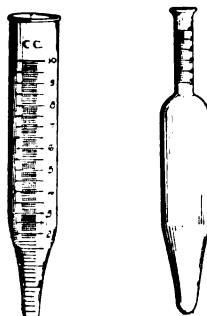
Manufacturer's rated capacity, ounces.....	16	32	64
Each .....	.45	.55	.60

**CEMENT, De Khotinsky Laboratory.** This well-known cement is not attacked by water, sulphuric, nitric or hydrochloric acids, bisulphide of carbon, benzine, gasoline or turpentine, and is very little affected by ether, chloroform, caustic alkalies, etc. Comes in small sticks of about 1 oz., large sticks of about 2 oz. and in bulk by the pound. Prepared in three different grades as follows: Hard for cementing glass, metal and porcelain; medium for cementing and insulating purposes; soft for insulating and covering electric wires, for condensers, static machines, protection against corrosion and for cementing rubber, hard rubber, wood, ivory, etc.

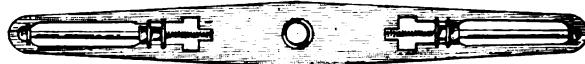
No. ....	Size .....	A Small Stick.	B Large Stick.	C Pound.
2440. CEMENT, De Khotinsky Laboratory, Hard.....		\$0.55	1.10	6.60
2441. CEMENT, De Khotinsky Laboratory, Medium.....		.55	1.10	6.60
2442. CEMENT, De Khotinsky Laboratory, Soft.....		.55	1.10	6.60



No. 2524.



No. 2548. No. 2555.



No. 2542.

2524. **CENTRIFUGE, Hand Driven**, high speed, giving from 1,000 to 3,000 revolutions per minute, for the rapid and accurate analysis of urine, sputum, blood, pus, milk and the precipitation of solids in any liquid. The case is of iron, well finished, the bearings accurate, the gear wheels cut by special machinery, and the pitch so calculated as to render the machine almost noiseless. Complete with two aluminum shields, one each 15 cc plain and graduated glass tubes. .... \$10.00

2526. **CENTRIFUGE, Hand Driven**, same as No. 2524, but with arm for holding four tubes. Complete with four aluminum shields, two each 15 cc plain and graduated tubes. This machine is capable of doing the work of two ordinary centrifuges ..... 14.40

2528. **CENTRIFUGE, Hand Driven**, same as No. 2524, with two tubes for the examination of urine and with haematocrit for the examination of blood and sputum..... 15.00

2530. **CENTRIFUGE, Hand Driven**, same as No. 2526, with four tubes for the examination of urine and with haematocrit for the examination of blood and sputum..... 20.40

#### Accessories for Hand Centrifuges.

2537. **TWO-TUBE HEAD** for 15 cc tubes, without shields or glass tubes ..... 4.35

2538. **FOUR-TUBE HEAD** for 15 cc tubes, without shields or glass tubes ..... 6.85

2539. **TWO-TUBE HEAD** for 50 cc tubes, without shields or glass tubes ..... 7.80

2540. **FOUR-TUBE HEAD** for 50 cc tubes, without shields or glass tubes..... 13.80

2542. **HAEMATOKIT**, with two tubes each for examination of blood and sputum..... 6.00

2543. **PERCENTAGE TUBE** for Blood Analysis, for No. 2542..... .75

2544. **SPUTUM TUBE** for No. 2542..... .36

2545. **DROPPER**, new construction, for filling the blood tubes..... .20

2546. **GRADUATED URINE TUBES**, 15 cc..... each .65  
per dozen 6.50

2547. **PLAIN URINE TUBES**, 15 cc..... each .15  
per dozen 1.65

2548. **GRADUATED TUBE**, length 4½ inches, outside diameter 1½ inch, graduated to 10 cc... .40

2549. **PLAIN TUBE**, same as No. 2548, but ungraduated, length of tube 4½ inches, outside diameter 1½ inch ..... 15

2550. **ALUMINUM SHIELD** for 15 cc tubes..... .25

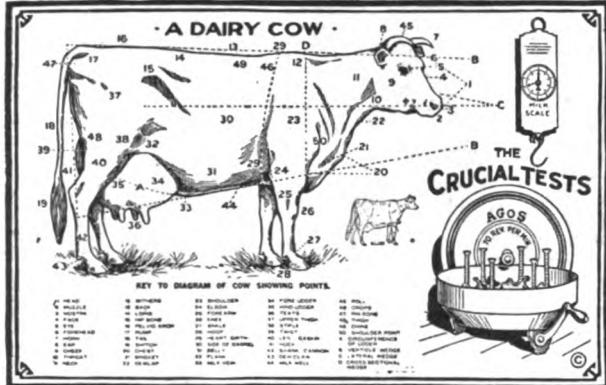
2555. **TUBE FOR MILK ANALYSIS**, graduated for obtaining a reliable test of either breast or cow's milk. It will give results accurate to within ¼ of 1 per cent. of fat..... .40

2559. **SPEED INDICATOR** ..... 3.00

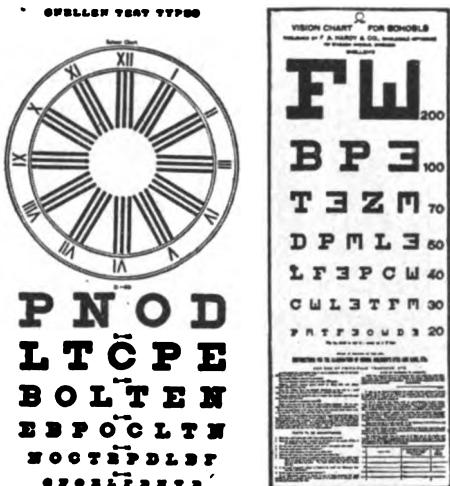
2800. **CHAMOIS SKIN**, for cleaning instruments, etc.

No. ....	A 6x8	B 9x11	C 10x13	D 14x18
Size, inches .....				
Each .....	.15	.30	.45	1.10

## CHARTS, ALL KINDS



No. A320—Chart No. 1.



No. F7391.

No. F7393.

**A320. CHARTS AGRICULTURAL**, on cloth, 3 feet 6 inches by 2 feet 4 inches. These charts were designed by Prof. G. A. Bricker of Ohio State University, and the diagrams are sufficiently large to be clearly seen across a large schoolroom. The series includes the following 10 charts:

No. 1. The Dairy Cow.	No. 6. The Walking Plow.
No. 2. The Beef.	No. 7. Spraying.
No. 3. The Horse.	No. 8. Grafting.
No. 4. The Chicken.	No. 9. Corn.
No. 5. The Hog and the Sheep.	No. 10. Wheat.

Complete with eyelets for hanging ..... Per chart \$0.75  
**F7391. CHARTS, Eye Test, Snellen's Test Types**, for school use, with astigmatism diagram. Size, 26x48 cm, on heavy bristol board, with eyelet for hanging ..... Each .25  
**F7393. CHARTS, Eye Test, Allport's Test Chart for Vision**, improved form of the Snellen Chart for Schools. The system proposed by Dr. Allport furnishes a simple method by which the eyes of school children may be tested. Complete directions are furnished with each chart. Size, 28x68 cm, on heavy bristol board, with eyelet for hanging ..... Each .25

## CHARTS, BOTANICAL

**CHARTS, Botanical**, a series of six charts for elementary Botany, 34x28 inches, in natural colors.

No. 1. The different kinds of common Roots.	
No. 2. The shape and different habits of growth of common Stems.	
Nos. 3-4. Leaves, illustrated morphologically.	
No. 5. Typical Flowers.	
No. 6. Fruits and Seeds of various types.	

**A330.** Each, mounted on cloth, with common rollers ..... 2.25  
**A331.** Each, mounted on spring roller, in steel case ..... 4.25  
**A332.** Complete set of above six charts on spring rollers in drop-front hardwood case ..... 20.50

**CHARTS, Botanical**, a series of six charts for Elementary Anatomical Botany, illustrating the structural character of plants as seen under the compound microscope. This set will take the place of more expensive and less convenient photomicrographs, which require a projection outfit and darkened room to demonstrate. Size, 34 x 28 inches.

No. 1. The Root System and its parts, as seen in different sections.	
No. 2. The Stem and Bud in longitudinal and transverse sections.	
No. 3. The Leaf and Leaf Stalk.	No. 5. The Flower in its parts.
No. 4. The Flower as a whole.	No. 6. The Fruit, Seed and Embryo.

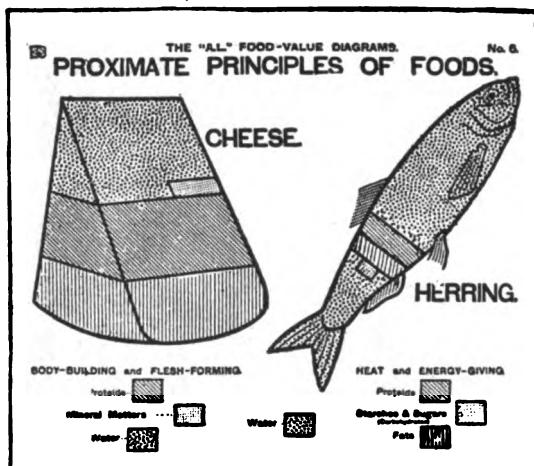
**A336.** Each, mounted on cloth, with common rollers ..... 2.25  
**A337.** Each, mounted on spring roller, in steel case ..... 4.25  
**A338.** Complete set of above six charts on spring rollers, in drop-front hardwood case ..... 20.50

**CHARTS, Botanical**, a series of four colored charts, 52x44 inches, adapted for advanced classes in high schools and colleges, with manual for each chart.

No. 1. Organs of Tissues, Plants, Root and Stem, 36 illustrations.	
No. 2. Leaves and Their Modifications, 36 illustrations.	
No. 3. Inflorescence, Whorls of the Flower, 38 illustrations.	
No. 4. Pistil, Ovule, Fruit, Seed, Organs of Flowerless Plants, 44 illustrations.	

**A344.** Each, mounted on cloth, with common rollers ..... 4.50  
**A345.** Each, mounted on spring roller, in steel case ..... 7.50  
**A346.** Complete set of four charts on spring rollers, in drop-front hardwood case, with manual ..... 27.00

**Note:** In ordering single charts, be sure to give both catalog number and chart number or title.



No. A360—Chart No. 5.

**A360. CHARTS, Arnold Food**, size 42 x 33 inches, for use in teaching the nutritive and calorific value of foods in dietary studies in physiology and home economics.

No. 1. **Proximate Principles of Food.** Chart showing, in tabular form, the average comparative food values of some typical animal and vegetable foods, i. e., the relative proportions of body-building and flesh-forming (proteids), and heat- and energy-giving materials (starches and sugars-carbohydrates and fats), in meat, fish (white and oily), egg, cheese, milk, bread, lentils, potatoes, fruits (fresh), nuts.

No. 2. **Amount of Food Necessary at Different Ages.** Chart showing, diagrammatically, the average amount (in ounces) of food constituents—proteids, carbohydrates, and fats—required for daily consumption by a healthy individual from birth to the age of 80 years.

No. 3. **Meat and Bread.** Chart showing, diagrammatically the average percentage of body-building and flesh-forming material, and of heat- and energy-giving material contained in a chop and a loaf of bread.

No. 4. **Milk and Egg.** Chart showing, diagrammatically, as in No. 3, a glass of milk and an egg.

No. 5. **Cheese and Herring.** Chart showing, diagrammatically, as in No. 3, a piece of cheese and a herring.

No. 6. **Banana and Potato.** Chart showing, diagrammatically, as in No. 3, a banana and a potato. This chart contains a diagram showing (by parts colored) the proportion of nutrient often lost in a potato by wrong method of cooking, i. e., when the skin is removed before boiling.

Mounted on cloth with plain rollers at top and bottom .....Per chart \$2.25

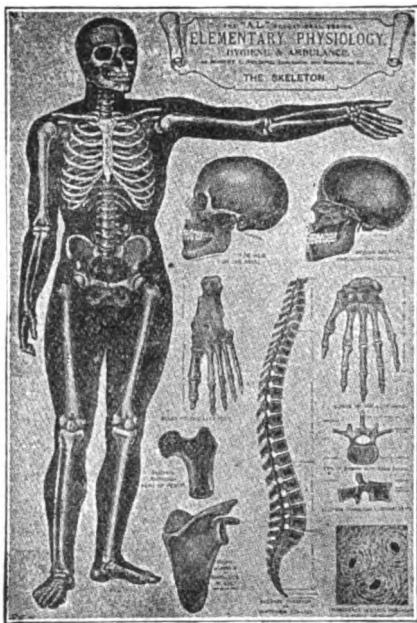
**A368. CHARTS, Langworthy Food**, a series of 15 colored charts each 21 x 27 inches in size. Prepared by C. F. Langworthy, Chief, Office of Home Economics, U. S. Department of Agriculture. These are mounted on muslin in groups of four so that the entire collection is on four group charts each 42 x 54 inches in size. The separate plates show nutritive values in the following foods:

Plate No. 1—Whole Milk, Skim Milk, Butter Milk, Cream. Plate No. 2—Whole Egg, Egg White and Yolk, Cream Cheese, Cottage Cheese. Plate No. 3—Lamb Chop, Pork Chop, Smoked Ham, Beef Steak, Dried Beef. Plate No. 4—Cod, Salt Cod, Oyster, Smoked Herring, Mackerel. Plate No. 5—Vegetable Oils—as Olive, Peanut and Cottonseed—, Bacon, Beef Suet, Butter, Lard. Plate No. 6—Corn, Wheat, Buckwheat, Oats, Rye, Rice. Plate No. 7—Bread and Other Cereal Food, White Bread, Whole Wheat Bread, Oat, Breakfast Food—Cooked, Toasted Bread, Corn Bread, Macaroni. Plate No. 8—Sugar, Molasses, Stick Candy, Maple Sugar, Honey. Plate No. 9—Parsnip, Onion, Potato, Celery. Plate No. 10—Shelled Bean, Fresh; Navy Bean, Dry; String Bean, Green; Corn, Green. Plate No. 11—Apple, Dried Fig, Strawberry, Banana. Plate No. 12—Grapes, Raisins, Grape Juice, Canned Fruit, Fruit Jelly. Plate No. 13—Walnuts, Chestnuts, Peanuts, Peanut Butter, Cocoanut. Plate No. 14—Functions and Uses of Food; Constituents of Food; Uses of Food in the Body. Plate No. 15—Dietary Standard for man in full vigor at moderate muscular work; estimated amount of mineral matter required per man per day.

Mounted on cloth with plain rollers at top and bottom .....Per chart 2.75

**Note:** In ordering single charts, be sure to give both catalog number and chart number or title.

## CHARTS, PHYSIOLOGY



No. A378—Chart No. 1. The Skeleton.

**A378.** **CHARTS, Elementary Physiology**, an excellent series of charts, 30 x 40 inches in size, accurately drawn by Anatomical Specialists almost entirely from the actual specimens concerned and beautifully printed in colors. All those minute and unnecessary details which are not required for school and popular teaching are omitted, but everything requisite for thoroughly understanding Human Physiology in its broad outlines, and in connection with Hygiene is included. No diagrams have yet appeared that approach these in simplicity, clearness, accuracy and suitability for the purposes intended. The names of the various organs or parts are printed boldly on, or by the side of, the portion referred to.

- No. 1. **The Skeleton.** Entire figure, with 10 enlarged details.
- No. 2. **The Muscles.** Entire figure, with 6 enlarged details.
- No. 3. **The Brain and Nervous System.** Entire figure, with 10 enlarged details.
- No. 4. **The Circulation of the Blood.** Entire figure, with 12 enlarged details.
- No. 5. **The Organs of Digestion and Assimilation, in situ.** With 11 enlarged details.
- No. 6. **The Structure of the Eye.** With 5 enlarged details.
- No. 7. **The Structure of the Ear.** With 8 enlarged details.
- No. 8. **The Skin and Excretory Organs.** With 9 enlarged details.

Mounted on cloth, with rollers at top and bottom ..... Per chart \$2.25

**A384. CHARTS, Health Diagrams**, designed to facilitate instruction in the laws relating to the care of the body. They emphasize, by the use of bold drawings and coloring, certain simple physiological facts, without emphasizing those anatomical details that prove somewhat repulsive and confusing to the young student of physiology. Size 33 by 42 inches.

- No. 1 shows, by means of typical heads, outlined in black, the relative position of the **Teeth** in the jaws of a child and an adult. The difference between the teeth, temporary, permanent, and sixth year molar, is indicated by different colors. The structure of a tooth is given in section, the enamel, dentine, and pulp cavity being shown in colors. (Illustrated above.)
- No. 2 shows the **Air and Food passages**, and by a coloring scheme, emphasizes the function of the nose as the organ of respiration, and the mouth as the commencement of the food-passage. The connection between the nose and ear is also indicated.
- No. 3 shows the position of the **Digestive Organs** by diagrammatic representation, avoiding too much anatomical detail.

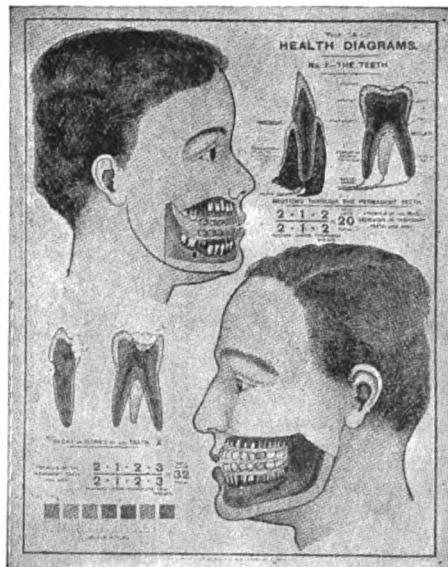
No. 4 shows the **Ear**, and indicates its connection with the nose, showing the relationship between breathing and hearing. The auditory ossicle and semicircular canals are diagrammatically shown in bold outline.

No. 5 shows the **Eye** in vertical section through the left orbit and its contents in the orbital axis, also the eye with its muscles in position in the head. Illustrations of common defects of eyesight, with the method of correcting them by means of lenses, are also shown.

No. 6 shows the **Nervous System** by a novel method of representation. The brain is mapped out into its sensory and motor areas, so far as these have been localized, and the connection of the cerebro-spinal and sympathetic nervous system with the muscles and organs is illustrated with a diagrammatic simplicity which have received the full approval of one of the leading authorities on the Nervous System and its functions.

Mounted on cloth, with rollers at top and bottom ..... Per chart 2.25

**Note:** In ordering single charts, give both catalog number and chart number or title.



No. A384—Chart No. 1. The Teeth.

**CHARTS, Physiology, American Frohse,** edited, revised and augmented by Max Brodel, Professor of Medical Drawing, Johns Hopkins Medical School, combining new and desirable features. The most important of these, probably, is their **life-size**, or larger, illustrations, permitting a wealth of detail which would be confusing if not entirely lost in figures or charts of smaller dimensions. A single figure possesses the advantage of showing all of the structures of a given area which a student would find by actual dissection of the part. These features render the charts particularly suitable for lecture or quiz work as the structures represented can be seen by the students from all parts of the lecture room. For group demonstrations and quizzes and for general use in the laboratory or dissecting room the charts are unequalled by any other form of printed illustrations.

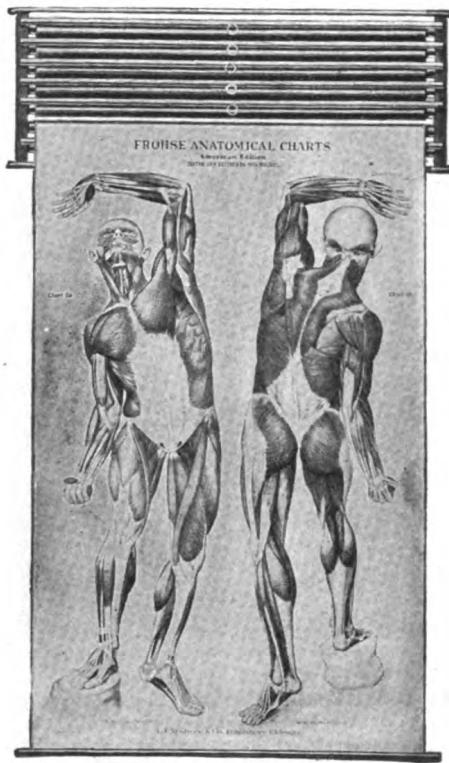
The set comprises seventeen life-size or larger figures (seven greatly magnified), which are printed on seven plates, 42 x 66 inches, as follows:

**Plate No. Chart No. SUBJECT.**

1	{ 1a	Human Skeleton, Front View.
		1b Human Skeleton, Back View.
2	{ 2a	The Muscles, Front View.
		2b The Muscles, Back View.
3	{ 3a	The Nervous System.
		3b The Circulatory System.
4	{ 4a	Schematic Diagram Circulation, greatly magnified.
	4b	The Heart and Principal Blood Vessels, magnified. Fig. 1—Anterior coronal section of Heart showing interior of right auricle and right ventricle. Fig. 2—Posterior coronal section of Heart showing left auricle and left ventricle. Fig. 3—Semilunar valve seen from above. Fig. 4—Mitral valve seen from above.
	{ 4c	The Skin. Fig. 1—Section through Hairless Skin. Fig. 2—Section through Hairy Skin (enlarged two hundred and fifty times).
	{ 5a	The Ear. Fig. 1—Coronal section through the Human Ear. Fig. 2—Internal Ear or Membranous Labyrinth.
5	{ 5b	The Eye. Fig. 1—The Left Human Eye—Horizontal Section. Fig. 2—Posterior Half of Eye—Viewed from Front. Fig. 3—Anterior Half of Eye—From Behind.
	{ 6a	Viscera of the Chest and Abdomen, First Layer.
6	{ 6b	Viscera of the Chest and Abdomen, Second Layer.
	{ 6c	Viscera of the Chest and Abdomen, Third Layer.
	{ 6d	Viscera of the Chest and Abdomen, Fourth Layer. (Showing four successive stages in dissection of thoracic and abdominal viscera).
	{ 7a	Median section through Head.
7	{ 7b	The Teeth. Fig. 1—Permanent Teeth of upper and lower jaws. Fig. 2—Lateral view of upper and lower jaws. (The nerve supply of the Teeth is shown in the upper jaw and the Blood Vessels in the lower.) Figs. 3a and 3g show the healthy teeth. Figs. 3b and 3f show the progress of decay. Fig. 3h shows proper filling.

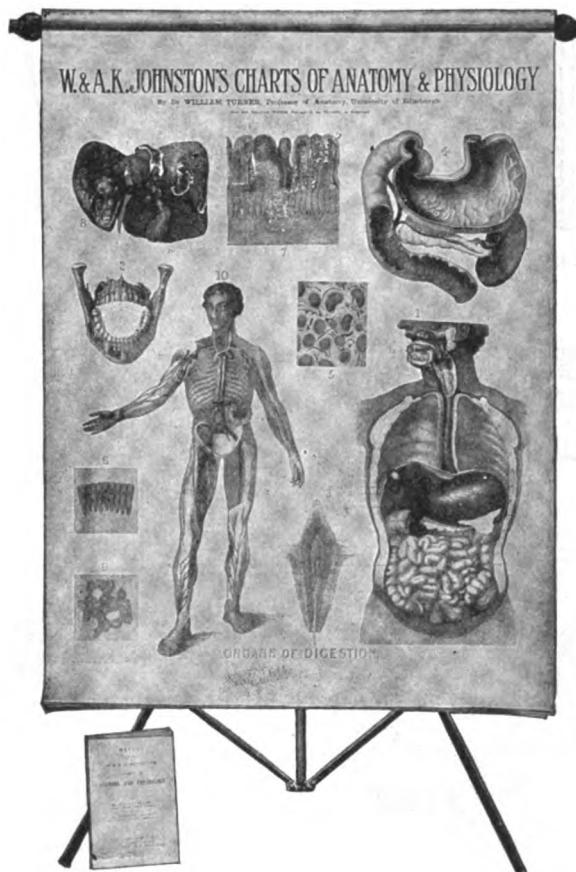
A396. Single full plates (specify by number), mounted on cloth, with rollers at top and bottom ..... Per plate \$11.00  
 A397. Separate charts from any plate (specify by number and letter), mounted on cloth, with rollers at top and bottom ..... Per chart 7.00  
 A398. Complete set of seven plates, in spring roller case, with key or index to all numbered parts, giving the terminology in Latin and English ..... 87.50

**Note:** In ordering single charts, be sure to give both catalog number and chart number or title.



No. A396—Plate No. 2.

Chart No. 2a—The Muscles, Front View.  
Chart No. 2b—The Muscles, Back View.



No. A404—Chart No. 6.

**A404. CHARTS, Johnston's Physiology**, arranged to exhibit all the leading facts to be observed in the study of the human body. The illustrations are selected with the view of showing clearly the principles involved in its construction. The figures have, in most instances, been drawn directly from nature and in the other cases from standard works on anatomy.

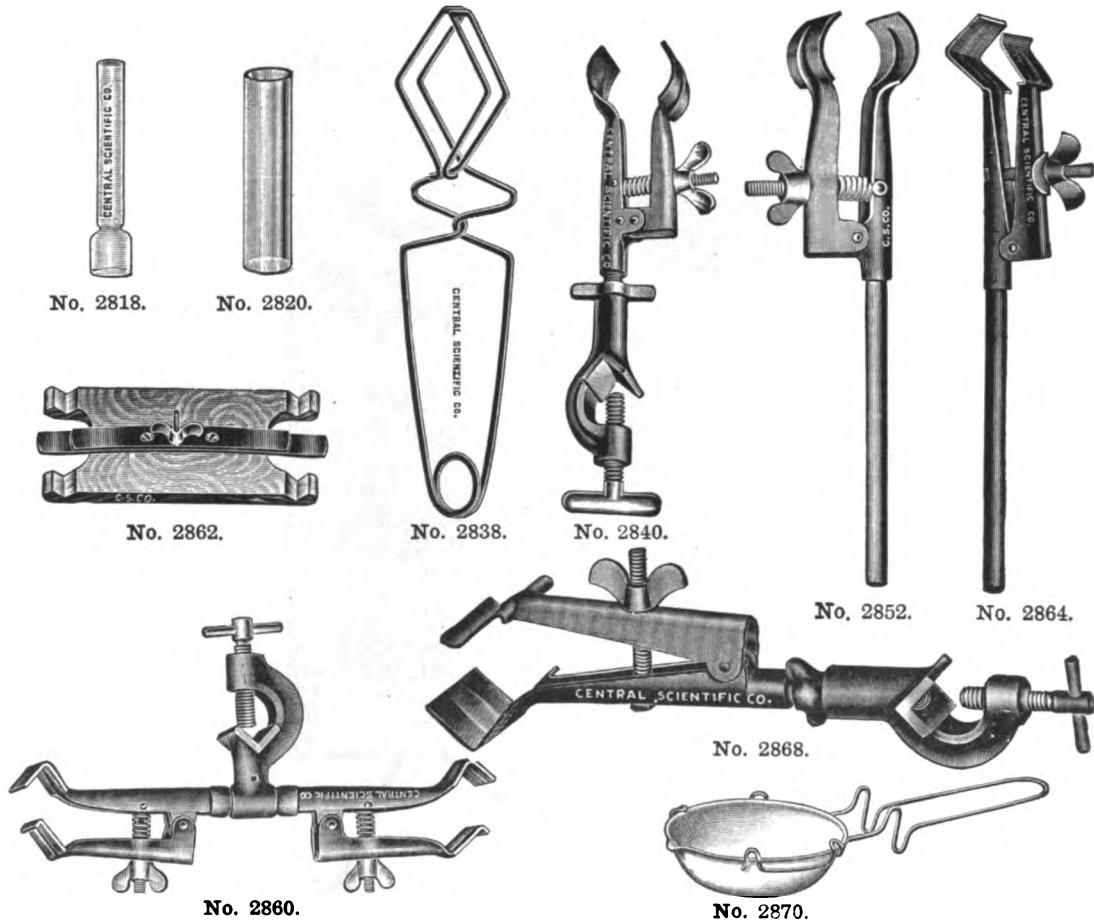
The charts are beautifully colored with especially prepared oil colors which are warranted never to fade. This is an important feature, as they are colored true to life, and it is therefore very essential that the delicate coloring remain permanently, unaffected by exposure to the light.

**Johnston's Physiological Charts** are equal, if not superior, to the expensive "Manikins" and "Portfolios" sold at two or three times their cost. Since the engravings are accurate and the coloring life-like, these constitute an excellent set of charts for use in teaching physiology.

The set consists of eight charts, 22 x 32 inches, as follows:

- No. 1. The Skeleton and the Structure of Bone.
- No. 2. The Joints and Ligaments and the Structure of Ligaments and Cartilage.
- No. 3. The Muscular System and the Structure of Muscle.
- No. 4. The Heart, Arterial Blood Vessels, Capillary Blood Vessels, etc.
- No. 5. Veins, Organs of Respiration, Circulatory System.
- No. 6. Lymphatics and Organs of Digestion.
- No. 7. The Brain, Nervous System and the Structure of the Skin.
- No. 8. Organs of Sense and Voice.

Complete set of eight charts, hand-mounted on cloth, with iron tripod adjustable stand, including Teachers' Manual..... \$11.50

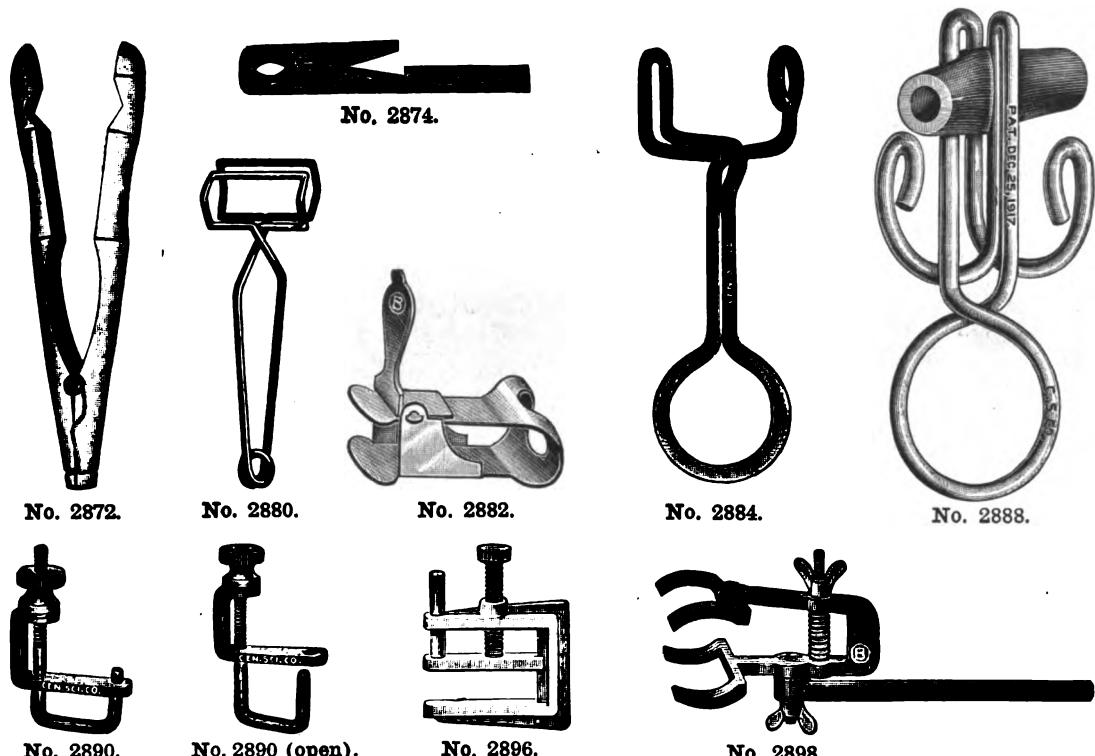


2816. CHEESE-CLOTH . . . . .	Per yard	\$0.12
2818. CHIMNEYS, Students' Lamp . . . . .	Per dozen	2.05
2820. CHIMNEYS, Argand, straight, 2x7 inches . . . . .	Per dozen	2.05

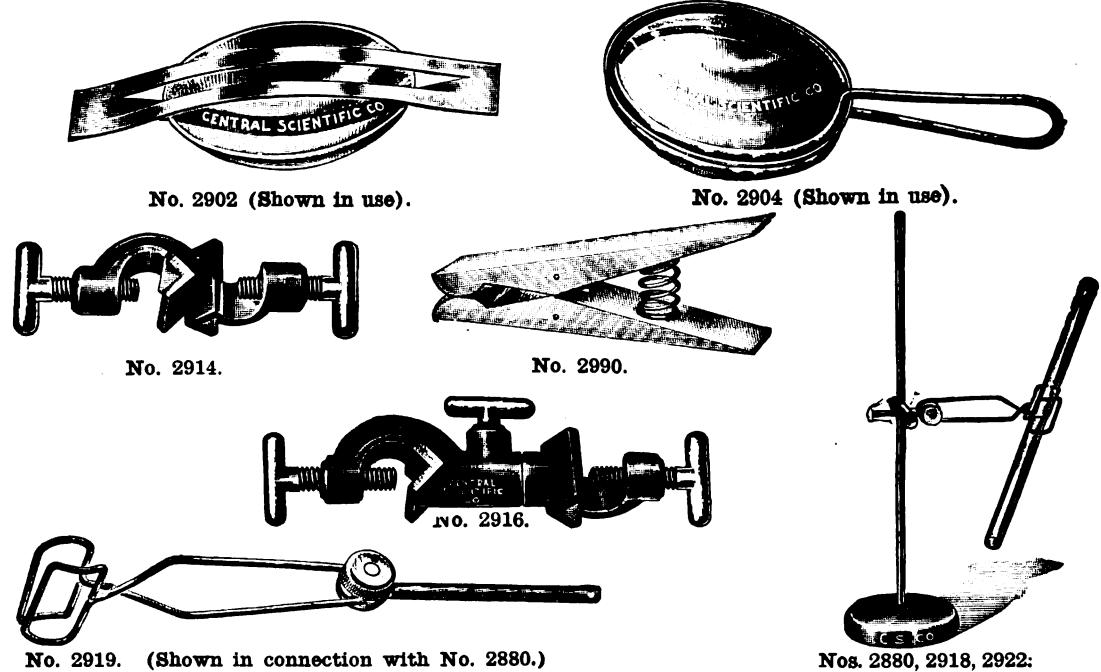
# **CLAMPS, ALL KINDS**

**2838. CLAMPS, Beaker, Chaddock's.**

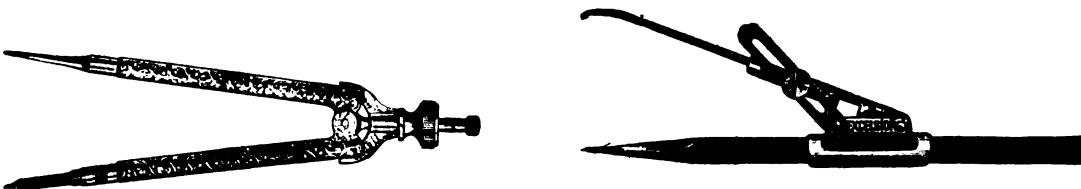
	A	B
No. ....	.....	.....
For beakers, cc.	75 to 250	250 to 550
Each .....	.25	.25
<b>2840. CLAMP, Burette, of stamped steel with rounded jaws; has check nut to adjust to any position, and clamp holder. An excellent clamp for general use .....</b>	<b>.50</b>	
<b>2842. CLAMP, Burette, same as No. 2840, but with jaws rubber covered.....</b>	<b>.55</b>	
<b>2844. CLAMP, Burette, same as No. 2840, but made entirely of brass.....</b>	<b>.90</b>	
<b>2846. CLAMP, Burette, same as No. 2844, but with jaws rubber covered.....</b>	<b>.95</b>	
<b>2852. CLAMP, Burette, Bunsen, of stamped steel with rounded jaws, for use with clamp holder No. 2914; for tubes, burettes, etc. Width of opening, 2 inches; total length, 9 inches; diameter of rod, <math>\frac{3}{8}</math> inches .....</b>	<b>.40</b>	
<b>2854. CLAMPS, Burette, Bunsen, same as No. 2852, but with rubber covered jaws.....</b>	<b>.45</b>	
<b>2860. CLAMP, Burette, Hofmann's, double.....</b>	<b>1.00</b>	
<b>2862. CLAMP, Burette, double, designed by Prof. Lincoln of the University of Illinois. Burettes are held perpendicular and are easily removed. A very convenient and rigid clamp, nicely made. ....</b>	<b>1.50</b>	
<b>2864. CLAMP, Condenser, new form, with V shaped jaws of stamped steel, enabling very small tubes to be clamped. For clamping thermometers, burettes, condensers, etc. For tubes up to <math>2\frac{1}{2}</math> inches; total length, 11 inches; diameter of rod, <math>\frac{3}{8}</math> inch.....</b>	<b>.80</b>	
<b>2865. CLAMP, Condenser, same as No. 2864, but with rod 12 inches long. Total length, 17 inches.</b>	<b>.70</b>	
<b>F151. CLAMP, Condenser, same as No. 2864, but with nickel-plated rod 12 inches long.....</b>	<b>1.25</b>	
<b>2868. CLAMP, Condenser, same as No. 2864, with check nut to adjust to any position, and with clamp holder attached .....</b>	<b>1.35</b>	
<b>2870. CLAMP, Dish, Stoddard's, of brass, white-plated, for holding evaporating and other dishes up to <math>4\frac{1}{2}</math> inches in diameter.....</b>	<b>.25</b>	



2872. CLAMP, Flask, for flasks and large tubes, of wood, with wire spring. Length, 10½ inches.	\$0.60		
2874. CLAMP, Test Tube, of wood, improved form with brass spring.....	.25		
2880. CLAMP, Test Tube, Stoddard's, of spring wire. Length, 4¾ inches. (See No. 2918 Clamp Holder.)	.15		
2882. CLAMPS, Tubing, Cut-off, of brass, nickel-plated.			
No. ....	A	B	
For tubing up to, inches.....	3/16	5/16	
Each .....	.06	.09	
Per dozen .....	.55	.90	
2884. CLAMPS, Tubing, Mohr's Pinchcock, of brass spring wire, nickel-plated.			
No. ....	A	B	C
Total length, inches.....	2 1/2	3	3 1/2
For tubing up to, inches.....	5/16	5/8	1/2
Each .....	.15	.18	.20
2888. CLAMPS, Tubing, Spring Pinchcock, Day's, Patented. Can be placed on or removed from rubber tubing without disconnecting apparatus. The most serviceable pinchcock made. Constructed of strong brass spring wire, white-plated.			
No. ....	B		
Length, inches.....	2 5/8		
For tubing up to, inches.....	5/8		
Each .....	.20		
2890. CLAMPS, Tubing, Screw Compressor, new form, of brass nickel-plated; a combination of Hofmann's and the old form; can be placed upon rubber tubing without disconnecting apparatus.			
No. ....	A	B	
For tubing up to, inches.....	5/16	1/2	
Each .....	.20	.30	
2892. CLAMP, same as No. 2890, but extra heavy, for pressure tubing up to ½ inch inside diameter.	.50		
2896. CLAMPS, Tubing, Hofmann's improved form, nickel-plated with open jaw.			
No. ....	A	B	
For tubing up to, inches.....	1/2	5/8	
Each .....	.25	.38	
2898. CLAMPS, Universal, with swivel jaws adapting themselves to irregular shapes; with check nut enabling object to be held at any angle. For use with Clamp Holder No. 2914.			
No. ....	A	B	
For tubes up to, inches.....	2	3	
Total length, inches.....	8	10	
Each .....	.65	.95	



	A	B
2900. CLAMPS, Universal, same as No. 2898, with jaws rubber covered. No. .... Each .....	\$.70	.90
2902. CLAMP, Watch Glass, of brass, nickel-plated, for watch glasses up to 2½ inches in diameter	.12	
2904. CLAMP, Watch Glass, of brass spring wire, for watch glasses up to 3 inches in diameter...	.10	
2914. CLAMP HOLDER, of iron with brass screws, for fastening clamps to support rods up to $\frac{1}{16}$ inch in diameter .....	.40	
2916. CLAMP HOLDER, same as No. 2914, with swivel, for attaching clamps at any angle....	.75	
2918. CLAMP HOLDER, Stoddard's, an ingenious device for rigidly holding Stoddard Wire Test Tube Holder No. 2880 in any position. Provides for vertical and horizontal adjustment to any angle, and will adapt itself to a great many uses in the laboratory. Clamp holder with right angle clamp, but without Test Tube Holder No. 2880.....	.50	
2919. CLAMP HOLDER only of No. 2918.....	.20	
2920. RIGHT ANGLE CLAMP only of No. 2918. Has one $\frac{7}{32}$ -inch hole and one $\frac{1}{4}$ -inch hole...	.30	
2922. BASE AND ROD for use with No. 2918 as shown in illustration. Base is heavy, and stable even with excessive load; rod is $15 \times \frac{1}{32}$ inches.....	.75	
2990. CLIPS, Spring, of wood, for holding tubes, etc. ....	Per dozen .20	
3006. CLOTH, Tracing, thin, good quality. Width, 36 inches: in rolls of 24 yards.....	Per yard 1.00	
	Per roll 19.50	



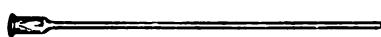
F521. COMPASS, Eagle Pencil. The most universally used school compass. Pen, pencil, divider and compass combined. Provided with set nut. Size 5½ inches over all. Complete with extra leads .....	Each .60
	Per dozen 6.00
F523. COMPASS, Pencil. Easily attached to a common pencil. Solid steel leg, durable and accurate. Without pencil .....	Each .15
	Per dozen 1.50



No. 3222.



No. 3224.



No. 3225.



No. 3246.



No. 3258.

3222. CONDENSER, Hopkins Reflux, with inner jacket 25 cm long. Excellent for quick condensation, as the cold water jacket in the center offers a large condensing surface to the vapor. Length of outside jacket, 27½ cm; total length, 38 cm. (See Journal of the American Chemical Society, for December, 1908). . . . . \$2.60

3224. CONDENSERS, Liebig's, of glass with rubber connections and adapter.

No.	A	B	C	D	E	F
Length of water jacket, inches.	10	12	15	20	25	30
Length of condenser tube, inches.	20	22	25	30	37	42
Each	1.25	1.30	1.40	1.70	2.30	2.60

3225. CONDENSER TUBES only for No. 3224, ½ inch in diameter.

Length, inches	20	22	25	30	37	42
For condenser jacket, inches	10	12	15	20	25	30
Each	.30	.33	.40	.45	.60	.65

3242. CORD, Chalk Line, Masons', ¼ inch; in hanks of 20 feet. . . . . Per hank .10

3244. CORD, Fish Line, Silk, braided, 25 yards on card . . . . . Per card .35

3245. CORD, Twisted Flax, fine quality, in ½-lb. balls . . . . . Per ball 1.10

3246. CORKS, XX Quality, regular length.

No.	0	1	2	3	4	5	6	7	8	9	10
Diam. at small end, inches	9/32	5/16	3/8	13/32	15/32	17/32	9/16	5/8	11/16	3/4	25/32
Per dozen	.05	.05	.05	.06	.07	.08	.10	.11	.14	.17	.18
Per gross	.30	.30	.30	.35	.38	.40	.50	.58	.67	.83	.91

No.	11	12	13	14	15	16	18	20	22	24	26
Diam. at small end, inches	13/16	7/8	15/16	1	11/16	13/32	17/32	111/32	113/32	115/32	117/32
Per dozen	.20	.22	.24	.27	.31	.38	.45	.55	.66	.80	.98
Per gross	1.00	1.10	1.20	1.38	1.55	1.88	2.25	2.75	3.30	4.00	4.88

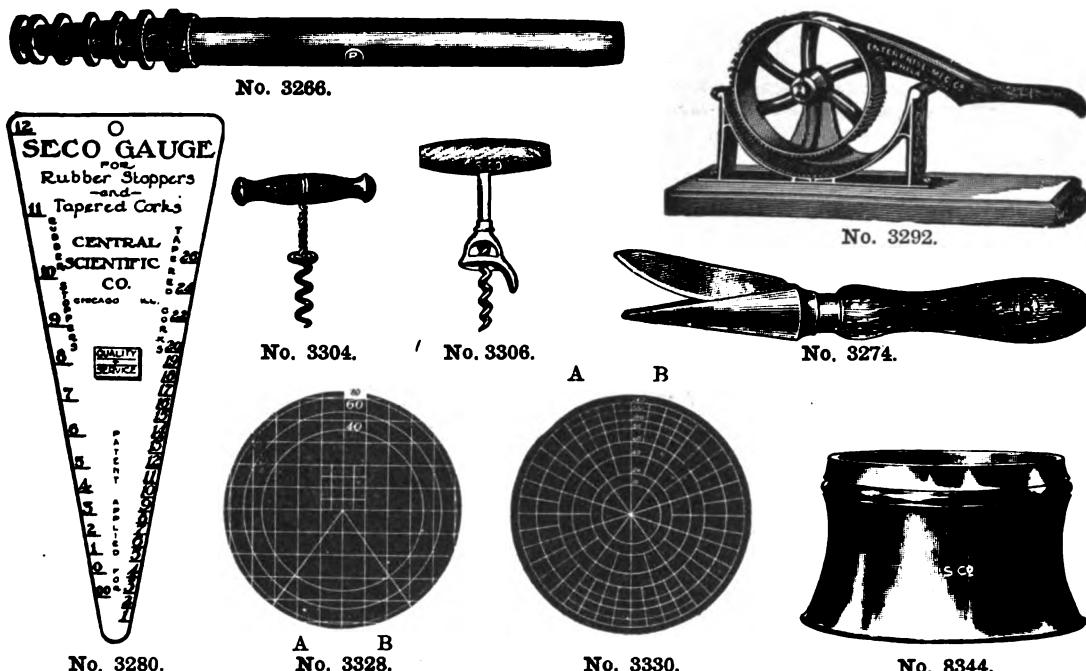
3252. CORKS, XX Quality, Nos. 0 to 11 assorted, in gross packages only. . . . . Per gross .75

3253. CORKS, XX Quality, Nos. 12 to 26 assorted, in gross packages only. . . . . Per gross 2.50

3258. CORKS, Flat Specie Corks, XX Quality, with slight taper; for wide mouth bottles.

No.	A	B	C	D	E	F	G	H	J	K	L	M
Diam. at large end, in.	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8
Diam. at small end, in.	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
Length, inches	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	5/8
Per dozen	.19	.19	.20	.24	.38	.45	.55	.64	.74	.85	.88	1.13
Per gross	.95	.95	1.00	1.20	1.88	2.25	2.75	3.20	3.70	4.25	4.40	5.65

No.	N	P	Q	R	S	T	U	V	W	X	Y	Z
Diam. at large end, in.	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/2	4	4 1/2	5	6
Diam. at small end, in.	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3 1/2	3 3/8	4 1/8	4 7/8	5 1/8
Length, inches	5/8	5/8	5/8	5/8	5/8	5/8	5/4	5/4	5/4	5/4	5/4	5/4
Per dozen	1.28	1.45	1.55	1.85	2.10	2.58	2.80	4.38	5.53	8.25	10.60	16.33
Per gross	6.40	7.15	7.65	9.25	10.50	12.90	14.00	21.90	27.65	41.25	52.40	81.75



3264. **CORK BORER**, hard brass, smallest size,  $\frac{3}{16}$  inch, with punch..... \$0.40

3266. **CORK BORERS**, hard brass, in sets, with punch for each set.

No.	A	B	C	D	E
Number in set.....	3	6	9	12	15
Diameter of borers, inches.....	$\frac{3}{16}$ - $\frac{5}{16}$	$\frac{3}{16}$ - $\frac{7}{16}$	$\frac{3}{16}$ - $\frac{5}{8}$	$\frac{3}{16}$ - $\frac{3}{4}$	$\frac{3}{16}$ - $\frac{7}{8}$
Per set.....	.75	1.50	2.50	4.00	6.00

3274. **CORK BORER SHARPENER**, steel cone with knife ..... 2.00

3280. **CORK GAGE**, of aluminum, for use in determining the proper size of cork or rubber stoppers for bottles, flasks, etc. For rubber stoppers from 00 to 12 and cork stoppers from 1 to 26.. .10  
For **CORK KNIFE** see No. 8146, page 92.

3292. **CORK PRESSES**, rotary form.

No.	A	B
For corks up to, inches.....	$\frac{3}{4}$	$1\frac{1}{4}$
Each .....	1.30	1.50

3298. **CORK SHEET**, of compressed cork faced on both sides with white glazed paper. Designed especially for mounting insects in entomological work. Size of sheets 18x24 $\frac{1}{4}$  inch. Per sheet 2.25

3300. **CORK SHEETS, XX Quality**, size 4x12 inches.

Thickness, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$
Each .....	.20	.30	.40
Per dozen.....	2.00	3.00	4.00

3304. **CORKSCREW**, wood handle..... .10

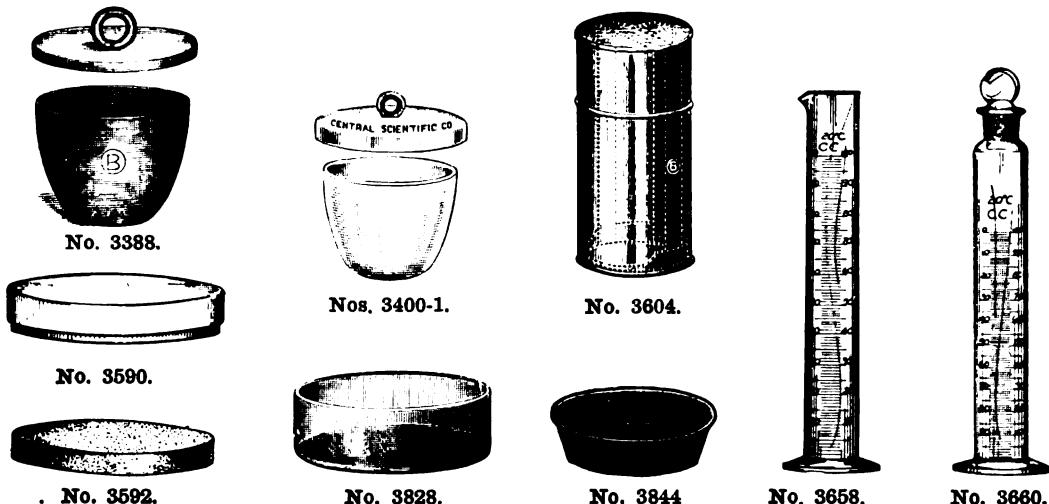
3306. **CORKSCREW**, self-pulling..... .70

3308. **CORKSCREWS**, twisted wire..... Per dozen .10

3328. **COUNTING PLATE**, Frost's, printed in black with white lines, on good quality Bristol board. The cross lines divide the figure into square centimeters. Four of these, just above the center, are subdivided. The numbers, 40, 60 and 80, give the area of the disks bounded by the circles just below them. The area of each sector, a and b, is one-tenth of the area enclosed by its circle..... .10

3330. **COUNTING PLATE**, Jeffer's, similar to No. 3328, but divided by concentric circles into equal areas, which are subdivided by radii or segments of radii into smaller integral portions. The numbers refer to the number of equal sections within the area enclosed by the circle just beneath the number. Within the sectors a and b the areas enclosed between the three outer circles are further subdivided into half-spaces. (See Journal of Applied Microscopy and Laboratory Methods, Vol. I, No. 3)..... .10

8344. **MAGNIFIER** for use in counting colonies of bacteria, magnifying 2 $\frac{1}{2}$  diameters. Recommended for use by the American Public Health Association. (See Standard Methods of Water Analysis for 1917, page 100)..... 2.75



## 3388. CRUCIBLES, Wrought Iron, light, with covers.

No.	A	B	C	D
Capacity, cc.	20	50	100	200
Diameter, inches.	1½	2½	2½	3½
Height, inches.	1¼	1½	2	2½
Each	\$0.30	.40	.50	.60

## 3400. CRUCIBLES, Best American Porcelain, high form, glazed throughout, without covers.

No.	000	00	0	1	2	3	4	5
Capacity, cc.	5	10	15	30	57	95	155	280
Diameter at top, mm.	26	30	35	41	52	62	72	87
Height, mm.	19	25	27	35	43	50	59	72
Each	.09	.12	.15	.24	.30	.35	.45	.55

## 3401. COVERS for Crucibles No. 3400.

No.	000	00	0	1	2	3	4	5
Diameter, mm.	32	35	42	47	59	73	81	95
Each	.05	.05	.05	.07	.09	.12	.12	.15

## 3590. CULTURE DISHES, Petri Plates, in pairs, of clear glass with thin flat bottoms, well annealed to withstand sterilizing.

No.	A	B	C	D	E	F	G
Diameter of upper dish, mm.	50	75	90	100	100	120	150
Depth, mm.	10	10	10	10	15	20	20
Per pair	.26	.26	.28	.30	.30	.55	.70

## 3592. COVER, of Porous Earthenware, for culture dishes 100 mm in diameter, to prevent spreading of growth by water of condensation during incubation.

.20

## 3594. COVER, of Porous Earthenware, same as No. 3592, but glazed.

.25

## 3604. CULTURE DISH HOLDER, for 100 mm dishes, of polished copper, with inside tray for removing dishes. Size, 9 inches high by 4½ inches in diameter.

4.25

## 3605. CULTURE DISH HOLDER, same as No. 3604, but made of sheet iron.

3.25

CULTURE SLIDES, see Microscope Accessories.

CULTURE TUBES, see No. 13358 Test Tubes.

## 3658. CYLINDERS, Graduated, with double graduations to read up and down, with lip.

Capacity, cc.	5	10	25	50	100	200	250	500	1000	2000
Graduated in, cc.	½	⅓	⅔	⅓	1	2	2	5	10	10
Each	.35	.40	.50	.60	.70	1.00	1.10	1.50	2.00	6.00

## 3660. CYLINDERS, Graduated, Mixing Bottles, with glass stopper. With double graduations to read up and down.

Capacity, cc.	10	25	50	100	200	250	500	1000	2000
Graduated in, cc.	½	⅓	⅔	1	2	2	5	10	10
Each	.80	1.00	1.20	1.40	1.80	2.00	3.00	4.00	8.00

For GRADUATES, Cone Shape, see page 77.

## 3828. DISHES, Crystallizing, of thin blown glass, with flat bottom, straight sides, and ground edges.

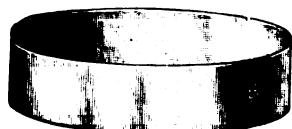
No.	A	B	C	D	E	F	G
Approx. diameter, mm.	50	80	100	125	150	190	250
Approx. depth, mm.	35	40	50	65	75	95	125
Each	.12	.15	.20	.36	.48	.80	1.85

## 3844. DISHES, Graniteware, flat bottom, with sloping sides.

No.	A	B	C
Approx. diameter, cm.			22
Manufacturer's rated capacity, quarts.		1	2
Each	.35	.38	.40



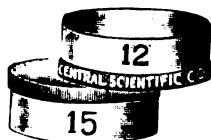
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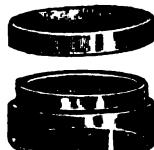
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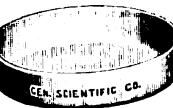
No. 1820.



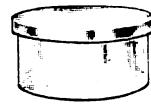
No. 1821.



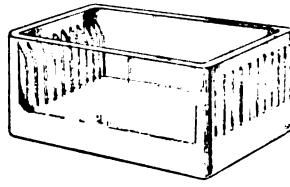
No. 2408.



No. 3860.



No. 3862.



No. 3868.



No. 3856.



No. 3870.

3832. DISHES, Evaporating, Best American Porcelain, highest quality, with lip, glazed inside and outside up to No. 5; larger sizes glazed inside, but only partly outside.

No.	000	00	0	1	2	3	4	5	6
Diameter, mm.	60	70	80	85	90	100	110	120	145
Approximate capacity, cc.	35	60	80	100	140	175	210	300	385
Each	\$0.12	.18	.20	.30	.35	.40	.45	.55	.70
No.	6A	7	8	8A	9	10	11	12	13
Diameter, mm.	162	185	215	230	265	305	360	400	460
Approximate capacity, cc.	535	765	1285	1430	2200	3250	5700	10000	16500
Each	.80	.90	1.20	1.50	1.80	3.00	4.00	9.00	18.00

3850. DISHES, Milk, Aluminum, with straight sides and flat bottom.

No.		A	B	C	D
Diameter, mm.		50	65	75	100
Depth, mm.		12	15	20	25
Each		.25	.30	.40	.45

2408. DISHES, Milk, Best American Porcelain, with straight sides and flat bottom, glazed inside and outside.

No.		1	3	4
Outside diameter, mm.		45	69	72
Depth, mm.		12	13	16
Capacity, cc.		13	25	45
Each		.25	.35	.40

1820. DISHES, Moisture, Aluminum, with cover of same fitting outside. Cover can be fitted on bottom to keep parts together when dish is open. Extensively used in soil laboratories for determining moisture.

No.		A	B	C
Diameter, mm.		50	63	89
Height, mm.		22	44	50
Each		.40	.50	.65

1821. DISHES, Moisture, Aluminum, same as No. 1820, but with dish and cover numbered to agree. In ordering please state what numbers are desired.

No.		A	B	C
Each		.45	.55	.70

3856. DISH, Moisture, Aluminum, with flat bottom, sloping sides, and inverted cover fitting tightly on inside. Diameter at top, 55 mm; height, 15 mm .....

.50

3860. DISHES, Preparation, of clear white glass, low form, with loose fitting cover.

No.		A
Diameter, mm.		50
Height, mm.		30
Each		.35

3862. DISHES, Preparation, Stender Dishes, with grooved covers ground to fit.

No.		A	B	C	D
Diameter, mm.		36	50	60	60
Height, mm.		19	25	28	39
Each		.20	.22	.30	.33

3868. DISH, Staining, of glass, with cover and grooves to hold ten 3 inch slides. Length outside, 3½ inches; width outside, 2½ inches.....

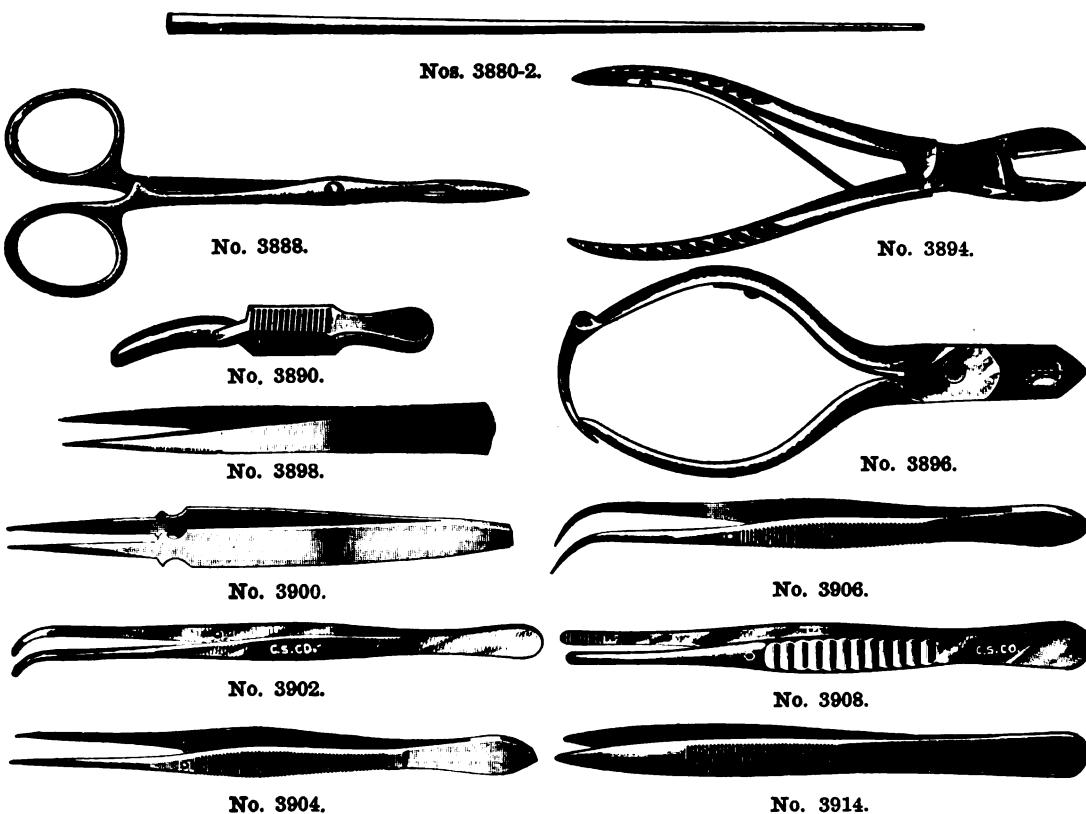
.35

3870. DISH, Staining, Embryological Cup, of solid glass with concavity in center, with one surface ground for writing. Dimensions 38x38x17 mm, with concavity 33 mm in diameter and 11 mm deep .....

.12

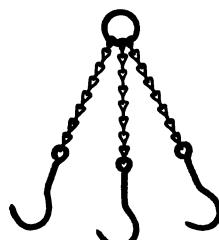
DISHES, Staining, Syracuse Watch Glasses, see Watch Glasses.

STAINING JARS, see Jars, Staining.



## DISSECTING INSTRUMENTS

3880.	<b>BLOWPIPE</b> for zoological work, nickel-plated, 125 mm long.....	\$0.12
3882.	<b>BLOWPIPE</b> for zoological work, nickel-plated, 188 mm long with very small orifice; especially suited for very small vessels.....	.35
3884.	<b>BRISTLES</b> , shoemaker's. Extra quality; useful as seekers for tracing out fine ducts and vessels.....	per 100 .30
3888.	<b>FORCEPS, Artery, Dressing Forceps</b> , of steel, nickel-plated, with corrugated jaws. Length, 115 mm.....	.140
3890.	<b>FORCEPS, Artery, Dieffenbach's</b> , self-closing, of steel, nickel-plated, with corrugated curved jaws. Length, 60 mm.....	.85
3891.	<b>FORCEPS, Artery, Dieffenbach's</b> , same as No. 3890, but straight.....	.85
3894.	<b>FORCEPS, Bone Cutting</b> , of steel, nickel-plated, very heavy and strong. The blades fit accurately and are easily separable for cleaning. Length, mm..... Each .....	200 225 4.00 4.50
3896.	<b>FORCEPS, Bone Cutting</b> , of steel, nickel-plated, with strong curved blades. Length, 125 mm.....	1.50
3898.	<b>FORCEPS, Dissecting, Fine</b> , of steel, nickel-plated, with smooth handles; fine, straight, smooth-points. Length, 110 mm.....	.10
3900.	<b>FORCEPS, Dissecting, Fine</b> , of steel, nickel-plated, with smooth handles; fine, straight, smooth points. Length, 95 mm.....	.25
3902.	<b>FORCEPS, Dissecting, Fine</b> , of steel, nickel-plated, with smooth handles; fine, curved, file-cut points. Length, 120 mm.....	.50
3904.	<b>FORCEPS, Dissecting, Fine</b> , of steel, nickel-plated, with corrugated handles; fine, straight, file-cut points, with guide pin. Length, 115 mm.....	.70
3906.	<b>FORCEPS, Dissecting, Fine</b> , of steel, nickel-plated, with corrugated handles; fine, curved, file-cut points, with guide pin. Length, 115 mm .....	.65
3908.	<b>FORCEPS, Dissecting, Medium</b> , of steel, nickel-plated, with corrugated handles; medium fine, straight, corrugated points, with guide pin. Length, 115 mm.....	.55
3910.	<b>FORCEPS, Dissecting, Medium</b> , same as No. 3908, but with curved points. Length, 110 mm .....	.60
3912.	<b>FORCEPS, Dissecting, Heavy</b> , of steel, nickel-plated, with corrugated handles; heavy, straight, corrugated points, with guide pin. Length, 115 mm.....	.80
3914.	<b>FORCEPS, Dissecting, Heavy</b> , of steel, nickel-plated, with corrugated handles; heavy, straight, file-cut corrugated points, without guide pin. Length, 125 mm.....	.70
	<b>FORCEPS, Blowpipe, Cover Glass, Pinning, Weight</b> , etc., see general heading, <b>Forceps</b> .	



No. 3920.



No. 3924.



No. 3928.



No. 3974.

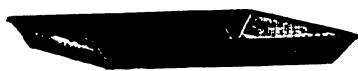
A

B

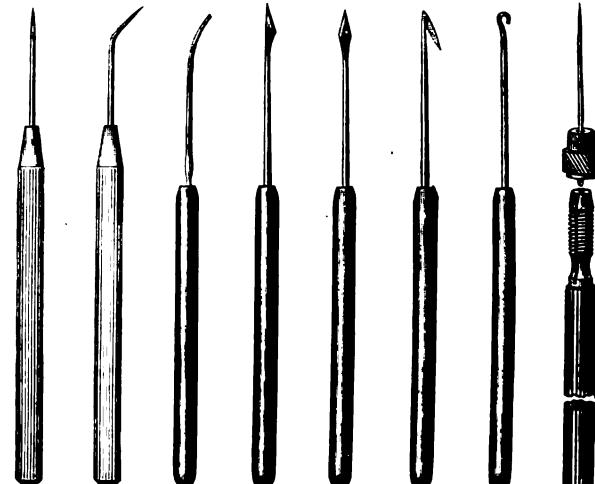
C

D

No. 3951 (full size).

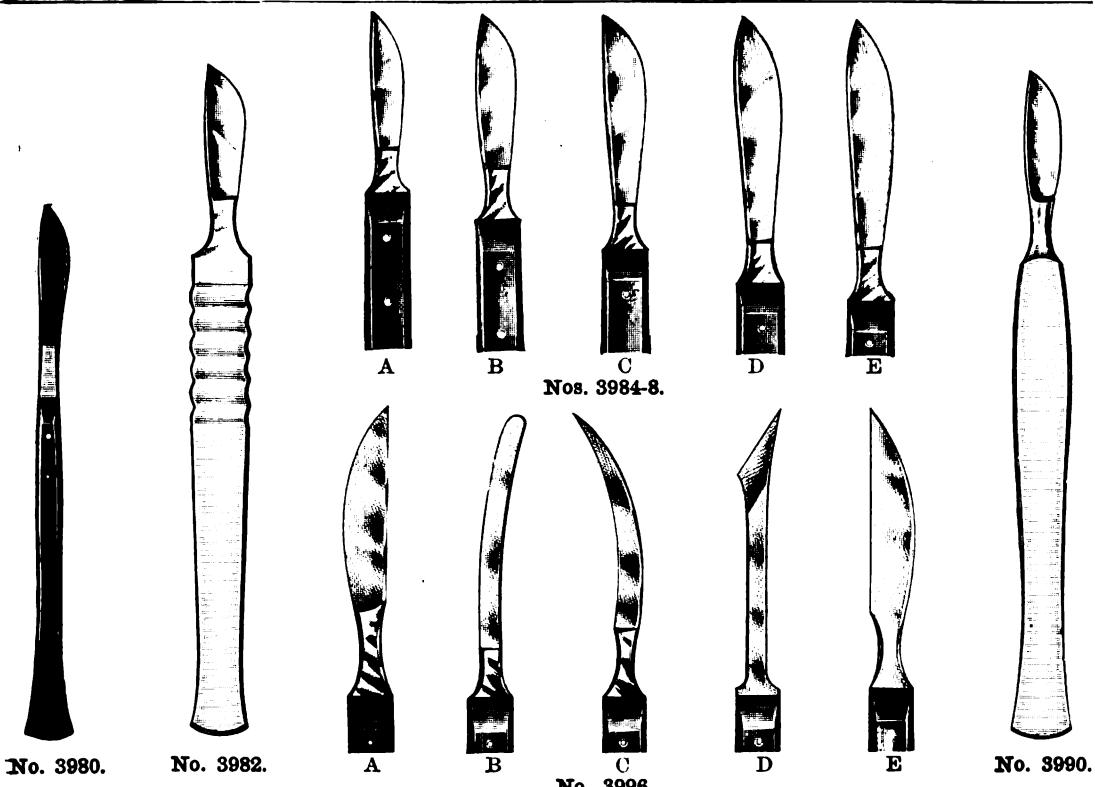


No. 3958.



No. 3932. No. 3934. Nos. 3936-8. No. 3940. No. 3942. No. 3944. No. 3946. No. 3948.

	A	B	C	D
3920. HOOK AND CHAINS, triple hooks, nickel-plated, with sharp points.....				\$0.30
3924. KNIFE, Cartilage, all steel, nickel-plated, corrugated handle; 50 mm cutting edge. Total length, 165 mm.....				.80
3928. KNIFE, Cartilage, Large, all steel, with flat ground blade, 135 mm long. Suitable for cartilage work and large dissections. Total length, 250 mm.....				3.75
3932. NEEDLE, Dissecting, of steel with plain wood handle 110 mm long; with straight sharp point. Length, 130 mm.....	per dozen			.30
3934. NEEDLE, Dissecting, same as No. 3932, but with bent sharp point.....	per dozen			.35
3936. NEEDLE, Dissecting, best quality, with curved sharp point.....				.30
3938. NEEDLE, Dissecting, same as No. 3936, but with curved blunt point.....				.30
3940. NEEDLE, Dissecting, same as No. 3936, but with half spear point.....				.30
3942. NEEDLE, Dissecting, with full spear point, with double cutting edge.....				.30
3944. NEEDLE, Dissecting, with harpoon shaped point, with two cutting edges.....				.30
3946. NEEDLE, Dissecting, hook shaped.....				.30
3948. NEEDLE HOLDER, of brass, nickel-plated, with screw chuck, with one straight needle. Length, 85 mm.....				.15
3950. NEEDLE HOLDER, same as No. 3948, but with one bent needle.....				.15
3951. NEEDLES, of steel, for use with Nos. 3948 and 3950 Holders. Length, 50 mm.				
Style .....	A	B	C	D
Known as .....	straight	spear	bent	hook
Per dozen .....	.08	.45	.12	.25
OIL STONE for sharpening Scalpels and Knives, see Nos. 9608 to 9612.				
3958. PAN, Dissecting, of tinned metal, with metal loops at the bottom for fastening limbs of animals during dissection; size, 285x235x25 mm, unlined .....				.36
3959. PAN, Dissecting, same as No. 3958, lined with wax on bottom.....				.55
3962. PAN, Dissecting, of heavy tinned metal, japanned, with metal loops for fastening limbs of animals during dissection. Dimensions, 290x190x30 mm deep.....				.40
3963. PAN, Dissecting, same as No. 3962, but with bottom covered with black wax, to which small objects may be pinned.....				.60
3966. PAN, Dissecting, of seamless agateware. Dimensions, 300x200x30 mm deep.....				.50
3967. PAN, Dissecting, same as No. 3966, but with bottom covered with cork, to which small objects may be pinned.....				.75
RAZORS, Section, see Microtome Knives.				
3974. SAW, Bone, of steel, nickel-plated, parts separable for sterilization. Length of blade, 200 mm; total length, 300 mm.....				.30



### SCALPELS

Scalpels are carried in three grades.

Grade C is made from a good grade of steel, carefully ground and sharpened. They are suitable for the ordinary elementary laboratory work of the student.

Grade B is made from carefully selected steel evenly honed. They are well finished, and can be used for the more advanced laboratory work by either student or instructor.

Grade A is made of the best English steel, tempered with the greatest care. The blades are hollow ground and finely honed. They will take and retain an edge such as is demanded for the most delicate dissections. They can be used in the most precise work in the private or research laboratory.

### SCALPELS, REGULAR SHAPE

#### 3980. SCALPELS, Grade C, with black wood handles.

No.	A	B	C
Length of cutting edge, mm.	25	38	50
Each	\$0.45	.60	.55

#### 3982. SCALPELS, Grade C, all steel, easily sterilized.

No.	A	B
Length of cutting edge, mm.	25	38
Each	.60	.60

#### 3984. SCALPELS, Grade B, with ebony handles.

No.	A	B	C	D
Length of cutting edge, mm.	25	32	38	45
Each	.50	.50	.50	.50

#### 3988. SCALPELS, Grade A, with ebony handles.

No.	A	B	C	D	E
Length of cutting edge, mm.	25	32	38	45	50
Each	.65	.65	.65	.65	.70

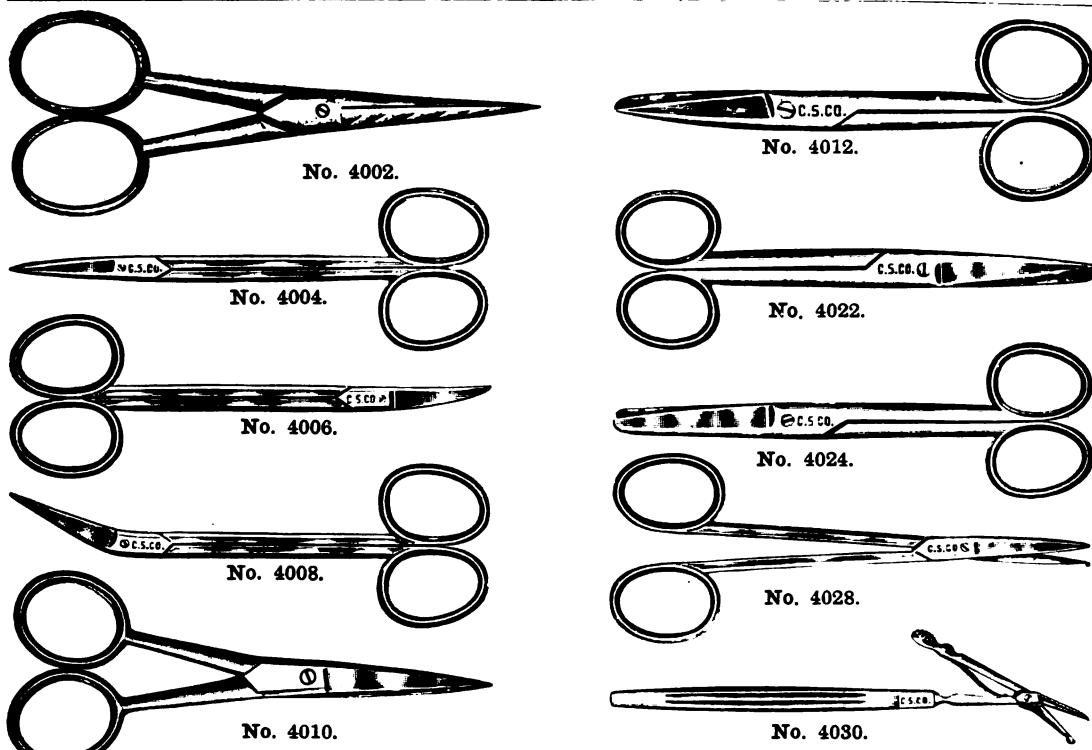
#### 3990. SCALPELS, Grade A, all steel, easily cleaned and sterilized.

No.	A	B	C	D
Length of cutting edge, mm.	25	32	38	45
Each	1.00	1.00	1.00	.100

### SCALPELS, SPECIAL SHAPES

#### 3996. SCALPELS, Grade A, with ebony handles.

Style	A	B	C	D	E
Length of cutting edge, mm.	35	35	35	10	50
Each	.60	.70	.70	.60	.80



### SCISSORS, DISSECTING

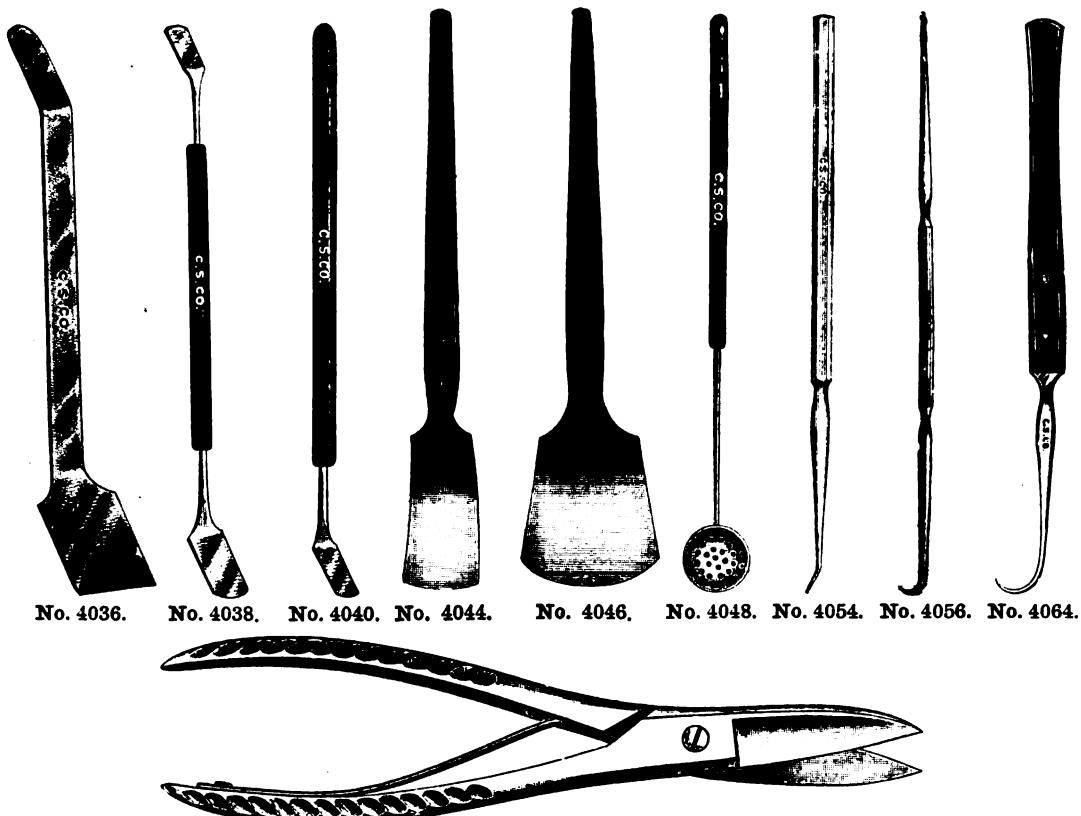
Dissecting scissors are carried in three grades, A, B, and C, and in three degrees of fineness, designated as fine, medium and heavy.

Grade C scissors are made of ordinary cutlery steel, and are suitable for ordinary student laboratory work.

Grade B scissors are made of the best grade of cutlery steel, nickel-plated, and are suitable for precise and delicate work in the advanced and research laboratory.

Grade A scissors are made of the best grade of cutlery steel, finely finished. They are made with slide lock instead of screw lock, being easily separated for cleaning and sterilization. These scissors can be used for dissecting and surgical work where freedom from bacterial contamination is essential.

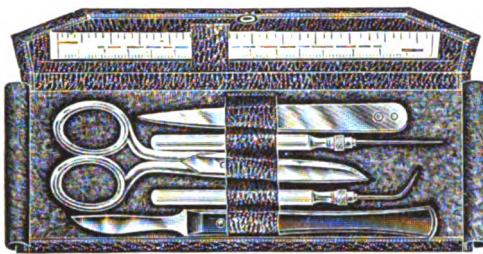
4002.	<b>SCISSORS, Grade C, Heavy</b> , nickel-plated, with screw lock, with straight sharp points. Length, 125 mm.....	<b>\$0.45</b>
4004.	<b>SCISSORS, Grade B, Fine</b> , with screw lock. Fine, straight sharp points. Length, 110 mm.....	.95
4006.	<b>SCISSORS, Grade B, Fine</b> , with screw lock. Fine, sharp points, curved upwards. Length, 110 mm.....	1.30
4008.	<b>SCISSORS, Grade B, Fine</b> , with screw lock. Fine, sharp points bent at angle to side. Length, 110 mm.....	.80
4010.	<b>SCISSORS, Grade B, Medium</b> , with screw lock. Medium fine, straight sharp points. Length, 115 mm.....	.95
4012.	<b>SCISSORS, Grade B, Heavy</b> , with screw lock. Heavy, straight points, one sharp and one blunt.	
	No. ....	A      B      C      D
	Length, mm.....	125      140      150      175
	Each .....	1.00      1.25      1.50      2.00
4016.	<b>SCISSORS, Grade A, Fine</b> , with slide lock enabling them to be easily taken apart for cleaning and sterilization. Fine, straight, sharp points. Length, 115 mm.....	1.20
4018.	<b>SCISSORS, Grade A, Fine</b> , with slide lock, with fine sharp points curved upwards. Length 115 mm.....	1.40
4020.	<b>SCISSORS, Grade A, Fine</b> , with slide lock, with fine sharp points, bent at angle to side. Length, 115 mm.....	2.25
4022.	<b>SCISSORS, Grade A, Heavy</b> , with slide lock. Heavy straight points, one sharp and one blunt. Length, mm.....	105      115
	Length, mm.....	1.25      1.40
	Each .....	
4024.	<b>SCISSORS, Grade A, Heavy</b> , with slide lock. Heavy straight points, both blunt. Length, 140 mm.....	1.50
4028.	<b>SCISSORS, Dissecting, Coronary Artery</b> , screw lock. Fine, straight points, with one sharp and one probe point.....	1.50
4030.	<b>SCISSORS, Invertebrate Dissecting</b> , for the most delicate work. Very fine, sharp points, with all metal handle. Length of cutting edge, 10 mm; total length of scissors, 140 mm.....	4.00



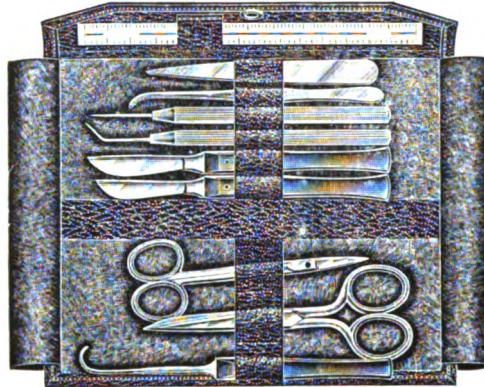
4036.	<b>SECTION LIFTER</b> , of German silver, with blade 16x18 mm; total length, 100 mm.....	\$0.22
4038.	<b>SECTION LIFTER</b> , with two German silver blades, set in ebony handle. Width of large blade, 10 mm; width of small blade, 6 mm.....	.50
4040.	<b>SECTION LIFTER</b> , similar to No. 4038, but with 6 mm blade only.....	.50
4042.	<b>SECTION LIFTER</b> , with ebony handle, and thin, flexible, German silver blade, 12 mm wide	.80
4044.	<b>SECTION LIFTER</b> , with ebony handle and thin, flexible, German silver blade, 20 mm wide	.85
4046.	<b>SECTION LIFTER</b> , with ebony handle and thin, flexible, German silver blade, 38 mm wide	.70
4048.	<b>SECTION LIFTER</b> , with ebony handle and perforated bowl 18 mm in diameter, for handling delicate specimens .....	.80
	<b>SECTION RAZORS</b> , see <b>Microtome Knives</b> .	
4054.	<b>SEEKER or Probe</b> , all steel, nickel-plated, with octagonal handle and bent, blunt point, as used in the anatomical laboratory of the University of Chicago. Length, 145 mm.....	.35
4056.	<b>SEEKER or Probe</b> , all steel, nickel-plated, with hexagonal handle. One end terminates in a fine, sharp point, while the other is curved, with sharp edge and sharp point. Length, 155 mm	.50
4060.	<b>SHEARS, Cartilage</b> , of steel, nickel-plated, with screw joint. Length of cutting edge, 60 mm; total length of shears, 230 mm.....	4.50
4064.	<b>TENACULUM</b> , ebony handle, steel shank, with tapering sharp hook. Length, 160 mm....	.70
4066.	<b>TENACULUM</b> , same as No. 4064, but with steel handle. Length, 160 mm.....	.90

### DISSECTING INSTRUMENT CASES

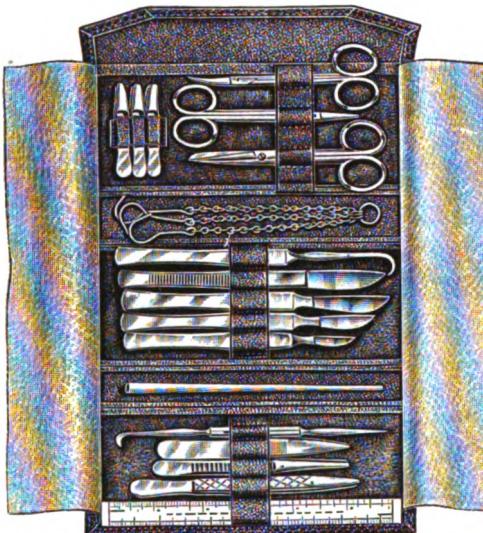
4072.	<b>DISSECTING CASE</b> , Leatherette, of best quality brown leatherette, almost equal to leather in appearance and durability, single-fold, lined with heavy cloth, and having cloth flaps, button fastener, and loops for 6 instruments.....	.30
4074.	<b>DISSECTING CASE</b> , Leatherette, similar to No. 4072, but two-fold, with loops for 12 instruments .....	.55
4076.	<b>DISSECTING CASE</b> , Morocco, of genuine morocco leather, two-fold, lined with velvet, and having chamois flaps, button fastener, and leather loops for 11 instruments.....	2.00
4078.	<b>DISSECTING CASE</b> , Morocco, similar to No. 4076, but three-fold, with loops for 17 instruments .....	2.80



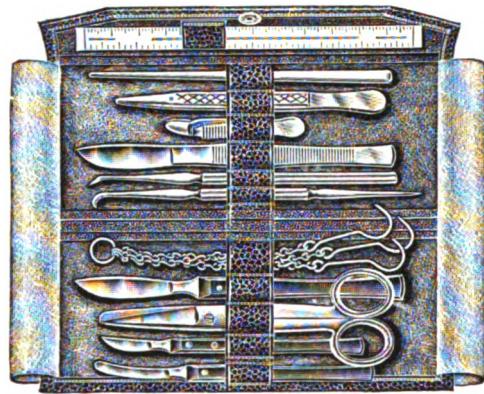
No. 4086.



No. 4092.



No. 4098.

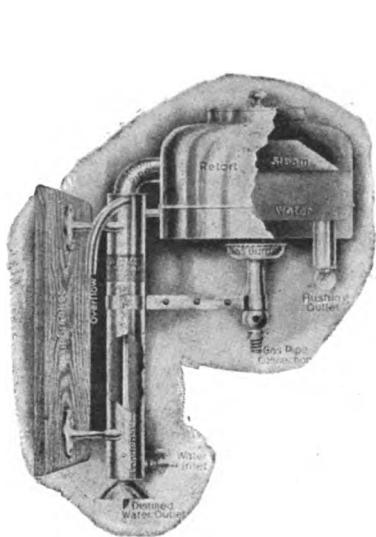


No. 4100.

### DISSECTING INSTRUMENTS IN SETS

The following sets have been made up of the instruments which have proved most popular for work in botany, zoology, anatomy, and histology. We will make up special sets to meet any requirements, using preferably the cases in the preceding list.

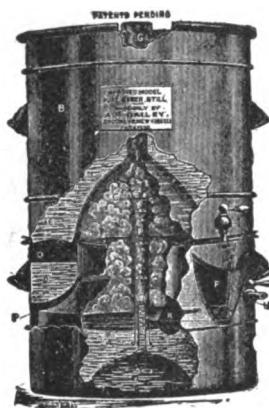
4084. <b>DISSECTING SET</b> , consisting of No. 4072 single-fold Leatherette Case, with the following Grade B and C instruments: No. 3898 Forceps, No. 3932 Needle, No. 3934 Needle, No. 3980B Scalpel, No. 4002 Scissors and No. F661 Rule.....	\$1.35
4086. <b>DISSECTING SET</b> , consisting of No. 4072 single-fold Leatherette Case, with the following Grade B and C instruments: No. 3898 Forceps, No. 3948 Needle Holder, No. 3950 Needle Holder, No. 3980B Scalpel, No. 4002 Scissors, and No. F661 Rule .....	1.60
4090. <b>DISSECTING SET</b> , consisting of No. 4072 single-fold Leatherette Case, with the following Grade B instruments: No. 3904 Forceps, No. 3906 Forceps, No. 3948 Needle Holder, No. 3950 Needle Holder, No. 3984C Scalpel, No. 4004 Scissors, and No. F661 Rule.....	3.40
4092. <b>DISSECTING SET</b> , consisting of No. 4074 two-fold Leatherette Case, with the following Grade B and C instruments: No. 3898 Forceps, No. 3902 Forceps, No. 3932 Needle, No. 3934 Needle, No. 3980B Scalpel, No. 3980C Scalpel, No. 4002 Scissors, No. 4004 Scissors, No. 4064 Tenaculum, and No. F661 Rule.....	4.25
4094. <b>DISSECTING SET</b> , consisting of No. 4074 two-fold Leatherette Case, with the following instruments: No. 3902 Forceps, No. 3914 Forceps, No. 3980A Scalpel, No. 3980C Scalpel, No. 4002 Scissors, No. 4004 Scissors, No. 3948 Needle, No. 3950 Needle, No. 8978 Section Razor with folding handle, and No. F661 Rule.....	6.50
4096. <b>DISSECTING SET</b> , consisting of No. 4076 two-fold Morocco Case, with the following Grade A instruments: No. 3904 Forceps, No. 3906 Forceps, No. 3924 Cartilage Knife, No. 3948 Needle, No. 3950 Needle, No. 4056 Seeker and Tenaculum, No. 3988C Scalpel, No. 3996A Scalpel, No. 4010 Scissors, and No. F661 Rule.....	7.00
4098. <b>DISSECTING SET</b> , consisting of No. 4078 three-fold Morocco Case, with the following instruments: No. 3908 Forceps, No. 3912 Forceps, No. 3914 Forceps, No. 3990A Scalpel, No. 3990B Scalpel, No. 3990D Scalpel, No. 4004 Scissors, No. 4006 Scissors, No. 4012A Scissors, No. 3924 Cartilage Knife, No. 4066 Tenaculum, No. 4056 Seeker, No. 3920 Triple Chain and Hooks, No. 3880 Blowpipe, 2 No. 3890 Artery Forceps, No. 3891 Artery Forceps, and No. F661 Rule.....	15.50
4100. <b>DISSECTING SET, Anatomical</b> , consisting of No. 4076 two-fold Morocco Case and the following Grade A instruments: No. 3882 Blowpipe, No. 3914 Forceps, No. 3890 Artery Forceps, No. 3924 Cartilage Knife, No. 4054 Probe, No. 4056 Seeker and Tenaculum, No. 3988C Scalpel, No. 3996A Scalpel, No. 3996B Scalpel, No. 4012D Scissors, No. 3920 Triple Chain and Hooks, and No. F661 Rule.....	9.50



No. 4120.



No. 4136.



No. 4138.

## DISTILLING APPARATUS

4120. **DISTILLING APPARATUS, Acme Automatic Water Still.** Made to hang on wall and can be placed wherever gas and water connections may most conveniently be made with pipes or rubber tubing. Occupies space 12x4 inches on the wall, projecting only 14 inches in its widest part. Fitted with removable cover to permit inspection if desired. Arranged to secure maximum amount of water for the minimum consumption of gas. Made of copper and brass, tin lined and nickel-plated. Capacity, one gallon per hour and one half. With gas burner \$30.00

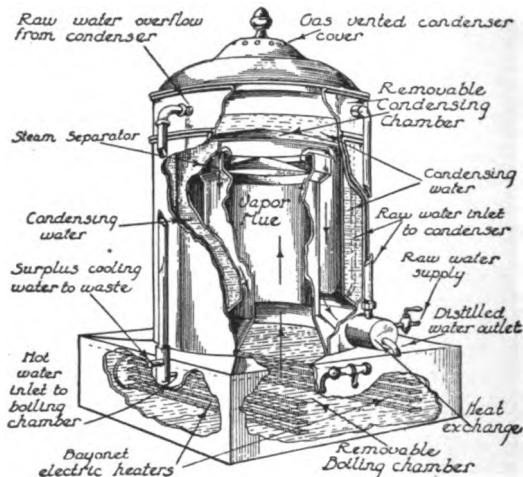
4136. **DISTILLING APPARATUS, Peerless Automatic,** built on an entirely new principle, as the boiler is so shaped that the steam is forced through the water to its center where it passes in a compact body into the condensing tube, thus reducing the amount of condensation on the side walls of the still. Because of this feature, it produces distilled water at a very low expense for gas. The parts are readily accessible for cleansing. The boiling vessel is of cast iron and not easily burned out or injured by rough handling. The condensing tube is of heavy tinned copper, sufficiently large to insure perfect condensation with a very small stream of water. Finished in bright aluminum and lacquered brass. With gas burner.

Capacity, gallons .....	1	3
Each .....	25.00	50.00

4138. **DISTILLING APPARATUS, Ralston's New Process.** May be used on any stove and does not require water under pressure. The storage of the distilled water within the still prevents the reabsorption of gases. Although not entirely automatic, it is so constructed that it cannot boil dry; it requires little care or attention. It is made of copper and pure tin. Capacity, from 1 to 3 quarts per hour, depending on the amount of heat used. Weight, 7 lbs.; diameter, 9 inches; height, 14 inches..... 12.00



Nos. 4126A-7A. (Patent Pending).



Sectional Diagram Showing Details of Construction.

**DISTILLING APPARATUS, Cenco Polar, Electrically Heated.** This still has been scientifically designed and carefully constructed in accordance with well established engineering principles relating to the efficient evaporation and condensation of water, and possesses certain features not found in other stills.

The condenser has no tubes to become limed up or leaky but consists of three concentric cylinders; the outer one forming the jacket of the still is cooled by radiation, while the inner two are cooled by a constant stream of water circulating between them in a spiral motion.

The boiling chamber is designed to maintain a small volume of water at constant level, spread out to afford as large a surface as possible for evaporation.

The vapor flue, through which the steam from the boiling water ascends, is high and wide, preventing any carrying over of impurities due to foaming or bursting of bubbles, or to the velocity of the vapor.

The steam separator at the top of this flue efficiently separates the dry vapor from the liquid particles, rolling them back into the boiler.

The high temperature of the cooling water—from 160° to 180°F.—which is made possible by the large area of condensing surface, effectually cooks out of the raw water any odors or dissolved gases, which pass out through vents in the cover of the still. This hot water is slowly fed to the boiler as required and consumes but little heat in bringing it to the boiling point.

The heaters are of the well known Westinghouse Bayonet type, designed for greatest efficiency.

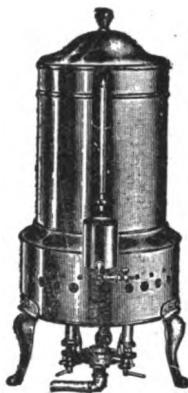
The interchangeable base makes it possible to lift out the top part of the Cenco Polar Still and set it in another base, equipped for gas or steam heat. This is a feature peculiar to the Cenco Polar Still. All parts of the still are easily accessible for cleaning, as the still can be taken apart without difficulty and can be set up when received with equal ease.

The heat exchange, just above the outlet for distilled water, reduces the temperature to within a few degrees of that of the room. By throttling down the supply of cooling water, distilled water at any temperature up to 200°F. can be obtained. The coil of block tin pipe, through which the distilled water passes on its way through the heat exchange, is surrounded by the cold condensing water just as it enters the still from the tap; consequently there is no opportunity for vapor to escape.

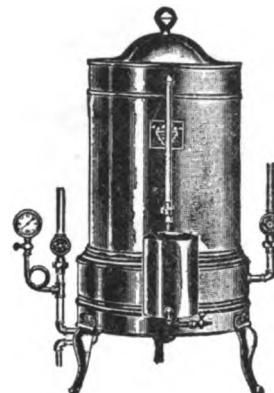
An aerator can be supplied at a small additional charge when it is desired to use the distilled water for drinking purposes.

Complete as described, constructed throughout of cold rolled copper heavily tinned, with Westinghouse Bayonet Heaters, attachment cord and three-heat switch for use on either A.C. or D.C. circuits. Sizes A to C are nickel-plated outside; D to F are furnished in burnished copper. All stills are furnished on flat base as illustrated, but may be had mounted on legs without extra charge if specified when ordering. Wall brackets are furnished for attachment to the wall at a small extra charge as listed below. With full instructions for setting up and operating.

No.	A	B	C	D	E	F
Capacity, gallons per hour.....	1	2	3	5	10	15
Height, inches.....	12	13 $\frac{1}{4}$	15	20	28	32
Diameter, inches.....	10	11	12	13 $\frac{1}{2}$	15	18
4126. For 110 volts.....	\$80.00	125.00	225.00	375.00	700.00	900.00
4127. For 220 volts.....	87.50	132.50	235.00	375.00	700.00	900.00



No. 4132, showing type of burners.



No. 4133, shown mounted on legs.

**EXTRA ELECTRIC HEATERS** for Nos. 4126 and 4127.

	For No. ....	A	B	C	D	E
4128.	Each, for 110 volts.....	\$30.00	35.00	45.00	50.00	60.00
4129.	Each, for 220 volts.....	37.50	42.50	45.00	50.00	60.00

4130. **AERATOR**, for use with Cenco Polar Stills, for the introduction of pure sterile air into the water when desired for drinking purposes.

	For No. ....	A	B	C	D	E
	Each .....	4.50	5.50	6.50	7.50	9.50

4131. **WALL BRACKETS** for use with Cenco Polar Stills, for attachment to wall.

	For No. ....	A	B	C	D	E
	Per pair .....	6.00	6.50	7.00	8.00	8.50

4132. **DISTILLING APPARATUS**, Cenco Polar, same as No. 4126, but equipped with interchangeable base and burner for coal or natural gas. Finished in burnished copper and polished brass.

No. ....	A	B	C	D
Capacity, gallons.....	1	2	3	5
Each .....	60.00	100.00	125.00	175.00

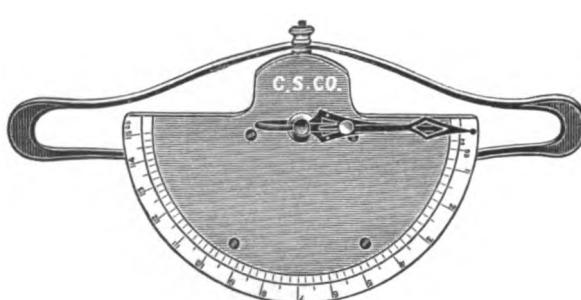
4133. **DISTILLING APPARATUS**, Cenco Polar, same as No. 4126, but equipped with interchangeable base and steam coil for steam heat, under a pressure of 10 to 20 pounds. Finished in burnished copper.

No. ....	A	B	C	D
Capacity, gallons .....	1	2	3	5
Each .....	60.00	100.00	125.00	175.00

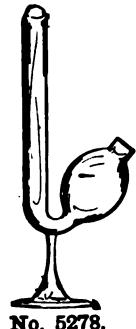
**Note:**—Nos. 4132 and 4133 may be had in nickel-plated finish at an additional cost of \$5.00.

**STILLS OF LARGE CAPACITY**

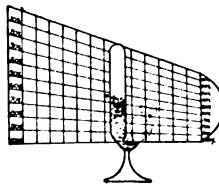
We are prepared to furnish information and prices upon distilling plants of large capacity, up to 1000 gallons per hour. We can place at the disposal of prospective purchasers the engineering knowledge and technical skill of the Jewell Polar Company, gained through years of successful experience in still design and manufacture. Write us at length about your particular problem.



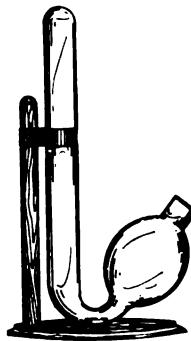
No. A460.

No. 5278.  
No. 5286.No. 5280.  
No. 5288.

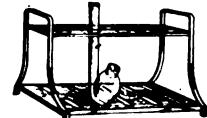
No. 5282.



No. 5284.



No. 5290.



No. 5292.

**A460. DYNAMOMETERS**, used for ascertaining the draft of plows, mowing machines, wagons etc. Can be attached to a tackle or a derrick for hoisting hay, feed, etc., the weight of which can at once be read on dial. Will also show what weight a horse can pull by securing one end and hitching an animal to the other. Each dynamometer is supplied with a loose pointer to remain at maximum strain.

No. ....	A	B	C	D	E
Range, lbs. ....	500	2,000	3,500	5,000	10,000
Smallest graduation, lbs. ....	5	25	50	50	100
Price ..... \$55.00	\$55.00	\$55.00	\$60.00	\$73.35	\$129.00

**FAUCET CONNECTIONS**, see Hose Connectors.

**5278. FERMENTATION TUBES**, Smith's, on glass foot.

No. ....	A	B
Length of closed tube, mm. ....	115	140
Diameter of closed tube, mm. ....	12	15
Each ..... .35	.40	

**5280. FERMENTATION TUBES**, Smith's, without glass foot.

No. ....	A	B
Length of closed tube, mm. ....	115	140
Diameter of closed tube, mm. ....	12	15
Each ..... .20	.25	

**5282. FERMENTATION TUBES**, same as No. 5280, but without bulb.

No. ....	A	B
Length of closed tube, mm. ....	125	175
Diameter of closed tube, mm. ....	12	15
Each ..... .20	.25	

**5284. CHART**, Frost's Gasometer, for measuring gas in fermentation tubes..... Each .10  
Per 100 6.00

**5286. FERMENTATION TUBE**, Standard, as adopted by the American Public Health Association. Length of closed tube, 140 mm; diameter of tube, 15 mm; diameter of bulb, 38 mm. On glass foot. (See "Standard Methods of Water Analysis," 1915, page 137)..... .50

**5288. FERMENTATION TUBE**, Standard, same as No. 5286, but without glass foot..... .35

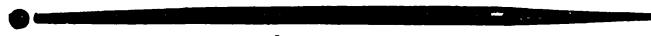
**5290. FERMENTATION TUBE SUPPORT** for single tubes. Of wood with brass clip for holding tubes .....

1.30

**5292. FERMENTATION TUBE SUPPORT**, of metal, for holding 10 fermentation tubes. Can also be used for test tubes, ureometers, and any tubes not less than 5 inches long..... 2.50



No. A500.



No. 5296.



No. 5298.



No. 5300.



Nos. 5320-6.

Nos. 5320-6.  
(Sectional View.)

**A500. FERTILIZER SAMPLES**, in four-ounce, screw-capped bottles, furnished with labels showing name and constituents, in set of twenty, as follows:

1. Acid Phosphate.	11. Kainit.
2. Sulphate of Ammonia.	12. Land Plaster.
3. Basic Slag.	13. Muriate of Potash.
4. Dried Blood.	14. Sulphate of Potash.
5. Raw Bone Meal.	15. Sheep Manure.
6. Steamed Bone Meal.	16. Nitrate of Soda.
7. Cottonseed Meal.	17. Tankage (Blood and Bone).
8. Cyanamid.	18. Ammonia and Phosphoric Acid.
9. Dried Fish Scrap.	19. Low Grade Complete Fertilizer (1-8-2).
10. Guano.	20. High Grade Complete Fertilizer (3-8-4).

Ammonia (Nitrogen) Content—Nos. 2, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 19, 20.

Phosphoric Acid Content—Nos. 1, 3, 5, 6, 7, 9, 15, 17, 18, 19, 20.

Potash Content—Nos. 7, 11, 13, 14, 15, 19, 20.

Calcium Sulphate Content—No. 12.

Lime Content—No. 3.

Set of twenty samples complete in a compartment carton ..... \$3.00

Note: Upon application, we shall be pleased to quote prices upon any of the above in bulk.

**5296. FILES, Rat Tail, bastard cut.**

Length of cut portion, inches.....	4	5	6	8
Each .....	.15	.16	.18	.24

**5298. FILES, Triangular, slim tapers, single cut, for use in the laboratory for cutting glass tubing.**

Length of cut portion, inches.....	3	4	5	6	8
Each .....	.10	.12	.14	.17	.24

**5300. FILES, Half Round, bastard cut.**

Length of cut portion, inches.....	.....	8	10
Each .....	.....	.80	.90

**5302. FILES, Half Round, cabinet wood rasps.**

Length of cut portion, inches.....	.....	8	10
Each .....	.....	.80	1.00

**5306. FILE HANDLES, soft wood with ferrule.**

Diameter, inches .....	1	1 1/4	1 1/4
Each .....	.03	.03	.03
Per dozen .....	.50	.50	.50

**5320. FILTERING APPARATUS for Soils, Brigg's Design, as described in Bulletin No. 31 of the Bureau of Soils. Extensively used in the filtration of soil solutions. Can be used in filtering any solution under pressure where a clear filtrate is desired. Consists of a cylinder of brass nickel-plated on the outside and heavily plated with silver inside, fitted with a Pasteur-Chamberland filter tube of unglazed porcelain. Capacity of reservoir, approximately 800 cc ..... 20.00**

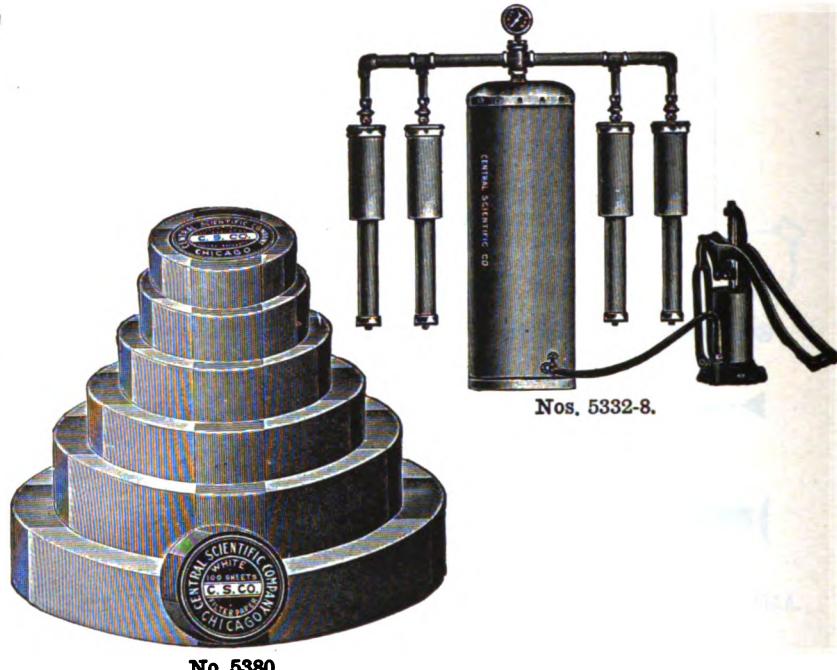
**5322. FILTERING APPARATUS for Serums, Brigg's Design, same as No. 5320, but with special bougie for serum filtration..... 20.00**

**5324. FILTERING APPARATUS for Soils, Brigg's Design, similar to No. 5320, but of iron, porcelain lined. Capacity of reservoir, approximately 750 cc. Complete with Pasteur-Chamberland Filter Tube ..... 15.00**

**5326. FILTERING APPARATUS for Serums, Brigg's Design, same as No. 5324, but with special bougie for serum filtration..... 15.00**



Nos. 5328-30.



Nos. 5332-8.

No. 5380.

.5328. **FILTERING APPARATUS** for Soils, Brigg's Design, similar to No. 5320, but complete with air pump and tank mounted on a substantial base. This makes a very convenient outfit for field use in soil investigations. Capacity of reservoir, about 250 cc. Complete as illustrated \$40.00

5330. **FILTERING APPARATUS** for Serums, Brigg's Design, same as No. 5328, but with special bougie for serum filtration..... 40.00

5332. **FILTERING APPARATUS** for Soils, Brigg's Design, consisting of four No. 5320 Filters, mounted as shown, complete with air reservoir of 10 gallons capacity, pressure gage and special compression pump..... 125.00

5334. **FILTERING APPARATUS** for Serums, Brigg's Design, same as No. 5332, but with special bougies for serum filtration..... 125.00

5336. **FILTERING APPARATUS** for Soils, Brigg's Design, same as No. 5332, but with four porcelain lined Filters No. 5324..... 105.00

5338. **FILTERING APPARATUS** for Serums, Brigg's Design, same as No. 5336, but with special bougies for serum filtration..... 105.00

5340. **FILTER TUBE**, for Soils, Pasteur-Chamberland, French make, for use with Nos. 5320, 5324, 5328, 5332, and 5336. Length over all, 10 inches; diameter of unglazed cylinder, 1 inch 2.00

5342. **FILTER TUBE (Bougie)**, for Serums, Pasteur-Chamberland, French make, for use with Nos. 5322, 5326, 5330, 5334 and 5338..... 2.00

### FILTER PAPER

5380. **FILTER PAPER** for qualitative work. A pure white paper of superior quality, strong and rapid. Cut in round filters, 100 in a package.  
 Diameter, cm..... 7.5 10 11 12.5 15 20 25 33 40 45 50  
 Per package of 100 sheets. .15 .20 .22 .24 .35 .55 .80 1.15 1.60 2.10 2.60

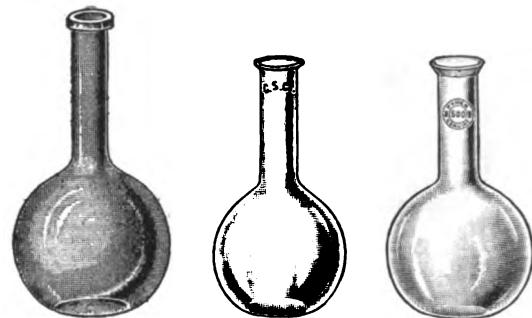
5381. **FILTER PAPER**, same quality as No. 5380, in sheets 20x20 inches.  
 Per quire..... .80  
 Per ream..... 12.20

5398. **FILTER PAPER**, for Agar Agar, similar to Chardin. The filters are folded and packed in boxes.  
 Diameter, cm..... 34 50  
 Number in box..... 30 25  
 Per box ..... 3.40 3.40

5514. **FINGER COTS, Rubber.**  
 No. .... A  
 For ..... men  
 Per dozen ..... .60 women .60



No. 5520.



No. 5532.

No. 5530-6.

No. 5540.

**5520. FIRST AID CABINET.** A neat hardwood case, 8x12x3½ inches deep, containing: one 1-inch gauze bandage; two 2-inch gauze bandages; one 2-inch cotton bandage to bind other dressings; one can mustard, especially prepared for emetics; two packages absorbent cotton; one package styptic gauze, medicated, to stop bleeding; one package surgical gauze, plain, for pads and compresses; one tourniquet, to stop arterial bleeding; one can powdered antiseptic soap, for washing hands and wounds; one can Recroso Ointment, for burns, scalds, cuts, etc.; one can Kapsikar Embrocation, for use as counter-irritant, for sprains, strains, congestion, etc.; one package court plaster; three safety pins; one envelope hooks and eyes, to hang case on wall. An excellent cabinet to have about the laboratory for treating cuts and burns. Complete as described \$4.00

**5530. FLASKS, Flat Bottom, Laboratory Grade, with vial mouth.**

Capacity, cc.....	30	60	120	180	250	360
To take rubber stopper, No.....	0	1	4	4	4	4
Each .....	.11	.12	.13	.14	.15	.19
Capacity, cc.....	500	750	1000	1500	2000	4000
To take rubber stopper, No.....	5	6	6	7	8	11
Each .....	.21	.29	.34	.42	.50	1.00

**5532. FLASKS, Flat Bottom, Laboratory Grade, with ring neck.**

Capacity, cc.....	120	250	360	500	750	1000	1500
To take rubber stopper, No.....	1	3	4	4	5	5	7
Each .....	.18	.22	.26	.29	.34	.39	.46

**5536. FLASKS, Flat Bottom, Resistance Grade, with vial mouth.**

Capacity, cc.....	30	60	120	180	250	350
To take rubber stopper, No.....	0	2	3	3	4	5
Number in original case.....	192	192	108	144	96	84
Each .....	.11	.12	.13	.14	.15	.19
Per original case.....	19.01	20.70	12.64	18.15	12.96	14.37
Capacity, cc.....	500	700	1000	1500	2000	4000
To take rubber stopper, No.....	5	6	6	8	9	9
Number in original case.....	72	36	36	24	18	12
Each .....	.21	.29	.34	.42	.50	1.00
Per original case.....	13.61	9.40	11.02	9.06	8.10	10.80

**5540. FLASKS, Flat Bottom, Pyrex Glass, with vial mouth.**

Capacity, cc.....	50	100	150	200	300	400	500
To take rubber stopper, No.....	0	1	1	3	4	4	6
Number in original case.....	192	168	108	144	96	84	72
Each .....	.17	.18	.20	.22	.25	.27	.30
Per original case.....	29.38	27.22	19.44	28.52	21.60	20.42	19.44
Capacity, cc.....	700	1000	1500	2000	3000	6000	12000
To take rubber stopper, No.....	6	7	7	8	9	10	10
Number in original case.....	36	36	24	18	12	12	6
Each .....	.36	.43	.51	.60	.76	1.60	3.00
Per original case.....	11.67	13.94	11.02	9.72*	8.21*	17.28*	16.20*

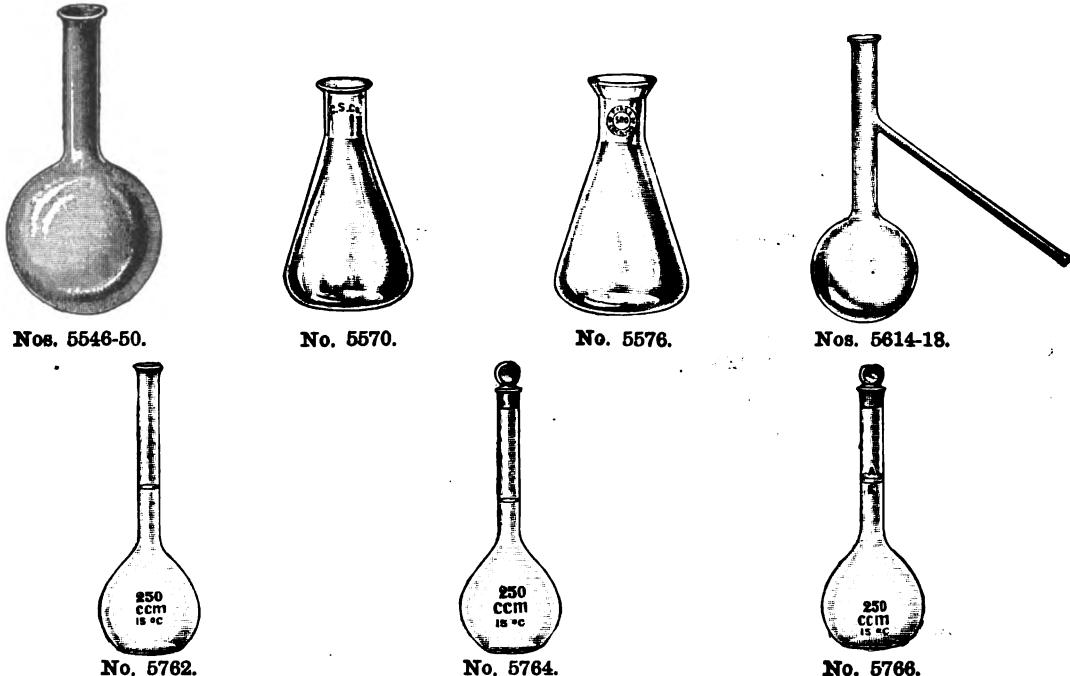
**5542. FLASKS, Flat Bottom, Pyrex Glass, with heavy ring neck.**

Capacity, cc.....	500	700	1000	1500	2000	3000	6000	12000
To take rubber stopper, No.....	5	6	7	7	8	9	10	10
Number in original case.....	72	36	36	24	18	12	12	6
Each .....	.38	.47	.55	.66	.78	.99	1.75	3.30
Per original case.....	24.63	15.23	17.82	14.26	12.46*	10.70*	18.90*	17.82*

**5546. FLASKS, Round Bottom, Laboratory Grade, with vial mouth.**

Capacity, cc.....	60	120	250	500	750	1000	2000
To take rubber stopper, No.....	0	2	4	5	6	6	7
Each .....	.14	.17	.20	.26	.31	.36	.56

\*Boxing charged at manufacturer's cost.


**5550. FLASKS, Round Bottom, Pyrex Glass, with vial mouth.**

No.	A	B	C	D	E	F	G	H
Capacity, cc.	100	200	300	500	700	1000	1500	2000
To take rubber stopper, No.	2	3	4	4	7	5	7	9
Number in original case	84	144	84	48	42	30	24	18
Each	.30	.18	.22	.28	.37	.45	.56	.71
Per original case	13.61	28.52	21.17	15.99	17.01	15.12	15.34	12.80*

**5570. FLASKS, Erlenmeyer, Resistance Grade.**

Capacity, cc.	60	120	180	250	350	500	700	1000	1500	2000
To take rubber stopper, No.	2	3	4	5	5	6	7	7	9	9
Number in original case	276	180	144	132	132	72	48	36	24	24
Each	.12	.13	.14	.15	.19	.21	.29	.34	.42	.50
Per original case	29.81	21.06	18.15	17.82	22.58	13.61	12.53	11.02	9.08	10.80

**5576. FLASKS, Erlenmeyer, Pyrex Glass.**

Capacity, cc.	25	50	100	150	200	250	300	500
To take rubber stopper, No.	00	1	3	4	5	5	6	6
Number in original case	360	276	180	252	144	132	132	72
Each	.16	.16	.18	.18	.20	.22	.25	.29
Per original case	51.84	39.75	29.16	40.83	25.92	26.14	29.70	18.80
Capacity, cc.	600	750	1000	1500	2000	3000	4000	
To take rubber stopper, No.	6	7	8	9	10	10	10	
Number in original case	60	48	36	24	24	15	12	
Each	.31	.34	.42	.51	.60	.79	1.00	
Per original case	16.74	14.69	13.61	11.02	12.96*	10.67*	10.80*	

**5614. FLASKS, Distilling, Laboratory Grade, regular shape, with side tube in middle of neck.**

Capacity, cc.	30	60	125	250	500	1000	2000
Each	.30	.40	.50	.75	.92	1.35	2.00

**5618. FLASKS, Distilling, Pyrex Glass, with side tube in middle of neck.**

Capacity, cc.	50	125	250	500	1000	1500	2000	3000
Number in original case	108	84	36	32	24	18	10	6
Each	.40	.50	.60	.70	1.18	1.45	1.60	2.15
Per original case	38.88	37.80	19.44	20.16	25.49	23.49	14.40*	11.61*

**5762. FLASKS, Volumetric, accurately graduated to contain, without stopper.**

Capacity, cc.	10	25	50	100	200	250	300	500	1000	2000
Each	.30	.35	.45	.55	.60	.65	.75	.95	1.25	2.00

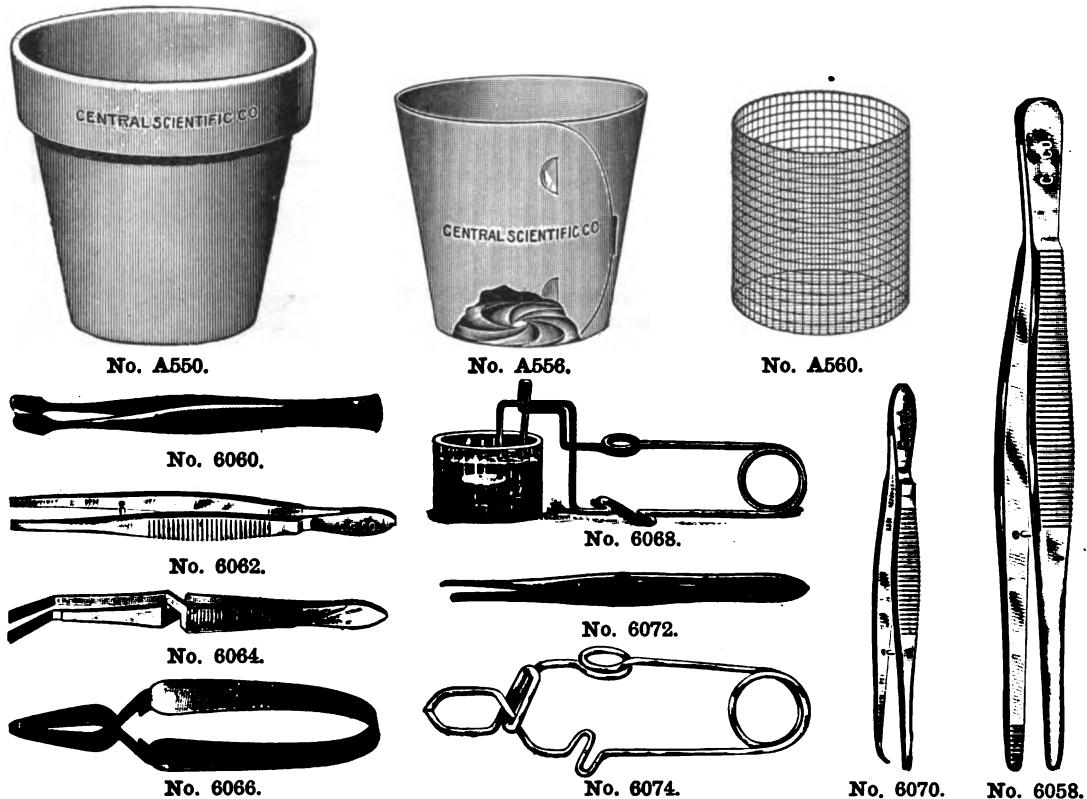
**5764. FLASKS, Volumetric, same as No. 5762, but with glass stopper ground in.**

Capacity, cc.	10	25	50	100	200	250	300	500	1000	2000
Each	.45	.55	.65	.95	1.00	1.05	1.15	1.25	1.50	2.50

**5766. FLASKS, Volumetric, with glass stopper and two marks on neck, graduated both to contain and deliver. Capacity, cc.**

Capacity, cc.	100	250	500	1000
Each	1.45	1.50	2.00	2.25

\*Boxing charged at manufacturer's cost.



**A550. FLOWER POTS, Earthenware**, standard form, without saucers. These pots are first quality and the strongest made, and because of their lightness and extreme porosity, they are the best growing pots on the market. They have what is commonly known as a "round bottom," which assists the drainage and permits the plants to dump more easily without breaking the ball of earth. Full size inside measure.

No.	A	B	C	D	E
Diameter, inches	2	4	6	8	10
Per dozen	\$0.25	.65	1.20	3.00	6.00

**A551. FLOWER POT SAUCERS**, first quality, to match No. A550 Flower Pots.

No.	A	B	C	D	E
Diameter, inches	3	4	6	8	10
Per dozen	.33	.66	.80	1.20	2.00

**A556. FLOWER POTS, Paper.** The most economical flower pots on the market. They are made from waterproof fabric, and for lightness, cleanliness and economy, have no equal. They are absolutely unbreakable, and much lighter in weight than clay.

No.	A	B	C	D
Height, inches	3	4	5	6
Per 100	1.10	1.80	3.20	4.00

**A560. FLOWER POTS, Wire Gauze**, as described in Farmers' Bulletin No. 257, and Bureau of Soils Circular No. 18. Made of galvanized wire gauze about 3 inches high and 3½ inches in diameter. The construction of these pots has been so planned as to enable the comparison of the action of fertilizers of different kinds and in varying quantities by actual measurements of the transpiration of growing plants. Wire pot only, not paraffined..... .25

**6058. FORCEPS, Bottle**, nickel-plated, extra length, for removing articles from bottles or jars. With corrugated points and handles. Length, mm ..... 200 250

Each ..... 1.80 2.00

**6060. FORCEPS, Cover-Glass**, thin bent blades, file back, nickel-plated. Length, 105 mm..... .95

**6062. FORCEPS, Cover-Glass**, with straight blades ground thin and guide pin. Length, 115 mm..... .75

**6064. FORCEPS, Cover-Glass**, self-closing, with thin, bent blades. Length, 125 mm..... 1.20

**6066. FORCEPS, Cover-Glass**, Cornet's, self-closing, of spring brass, nickel-plated. Length, 115 mm .. .40

**6068. FORCEPS, Cover-Glass**, Kalteyer's, of spring brass wire, nickel-plated, for staining on cover-glass. Length, 100 mm..... .55

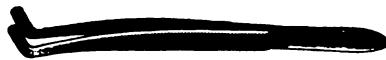
**6070. FORCEPS, Cover-Glass**, Novy's, of steel nickel-plated, with corrugated handles, with one blade flat, the other curved and pointed. With guide pin. Length, 115 mm..... .85

**6072. FORCEPS, Cover-Glass**, Novy's, similar to No. 6070 but with locking device. Length, 115 mm ..... 1.50

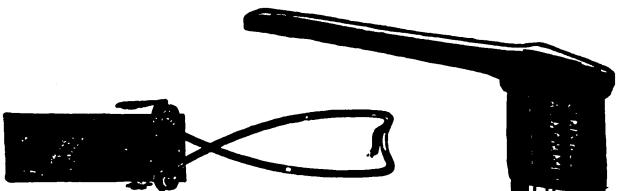
**6074. FORCEPS, Cover-Glass**, Stewart's original form, of steel wire, nickel-plated. Length, 115 mm .. .20



No. 6076.



No. 6080.



No. 6090.



No. 6082.

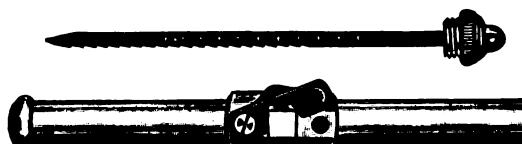


No. 6092.

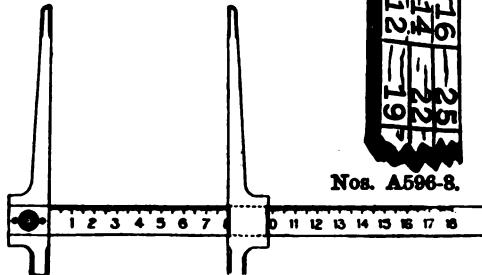
LUFKIN RULE CO.  
AQUINAW, MICH.

3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8		

No. A580.



No. A584.

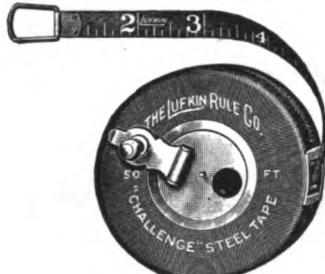


No. A612.

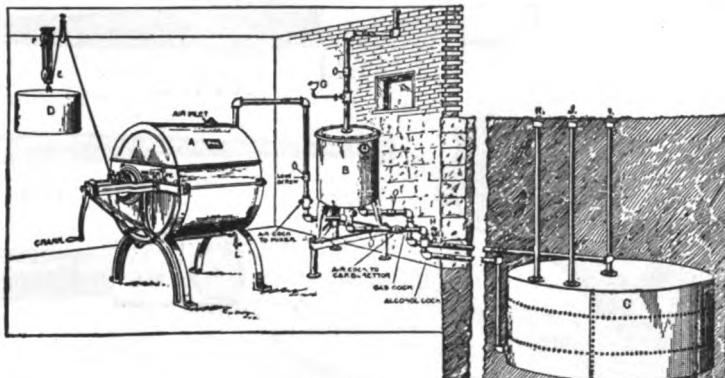
6076. FORCEPS, Cover-Glass, Stewart's, with ring; of steel wire, nickel-plated. Length, 115 mm	\$0.18
FORCEPS, Dissecting, see Dissecting Instruments.	
6080. FORCEPS, Pinning, bent blades, corrugated points and handles. Length, 110 mm.....	1.20
6082. FORCEPS, Pinning, Blake Form, for heavy work. Length, 125 mm.....	.85
6090. FORCEPS, Slide, Kirkbride's, for staining on slide, of steel wire, nickel-plated. Length, 120 mm.....	.15
6092. FORCEPS, Steel, heavy, for general laboratory work. Length, inches.....	5 .6
Each .....	.10 .15
6094. FORCEPS, Brass, same style as No. 6092. Length, 5 inches.....	1.25

### FORESTRY INSTRUMENTS

A580. BOARD RULE, three tier, extra heavy diamond head, figured 30 inches with 6 inch handle; full length 3 feet; for boards from 8 to 18 feet long .....	2.90
A584. INCREMENT BORER for determining the age or judging the rate of growth of standing timber; also for noting the depth of penetration of a wood preservative and its effect on cellular structure. By means of this borer, a smooth clean core may be removed from the wood so that the observations may be carefully made. For use in either hard or soft woods.	
Length of bore, mm.....	60 150 250
Each .....	7.50 14.85 22.50
A596. LOG RULE, Doyle Scale, solid hook, figured 48 inches with 8 inch handle; full length 4 feet 8 inches; for logs from 12 to 24 feet long .....	3.10
A598. LOG RULE, Scribner Scale, otherwise same as No. A596.....	3.10
A612. TREE CALIPER, 18 inch, of fine seasoned hardwood, best workmanship, both sides of beam graduated to 10ths inches and plainly numbered. The arms are removable for convenience in transportation. The stationary arm is held by brass clamp nut with lock nut. The eye of sliding arm is brass lined all around.....	3.50
A614. TREE CALIPERS, same as No. A612, but with two clamp nuts.	
Length, inches .....	24 30 50
Each .....	5.00 6.00 7.15



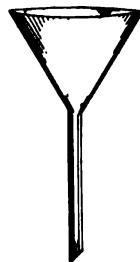
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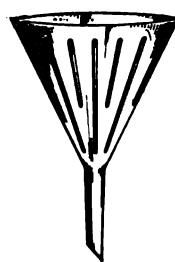
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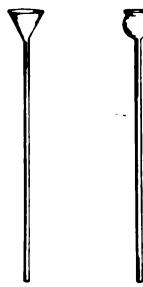
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No. 6112.



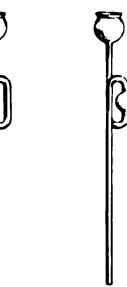
No. 6126.



No. 6192.



No. 6194.



No. 6196.



No. 6198.

13326. **TREE TAPE**, giving directly the diameter of tree when its circumference is measured. Metal lined hard leather case with nickel-plated trimmings, folding flush handle opened by pressing upon a pin on opposite side. The tape is of steel  $\frac{3}{16}$  inch in width and 50 feet long, graduated on one side in feet, tenths, and hundredths, and on the other side in diameters (inches and tenths of inches). Fitted with a special peg or spike for fastening to tree. (Not shown in illustration.) ..... \$9.00

**6100. FUNNELS, Agateware.**

No.	A	B	C	D	E
Capacity, pints	$\frac{1}{2}$	1	2	4	8
Diameter, inches	$3\frac{3}{4}$	$4\frac{1}{4}$	$5\frac{1}{2}$	$7\frac{1}{2}$	9
Each	.60	.70	.75	.85	1.10

**6112. FUNNELS, Glass, Bunsen**, with angle of  $60^\circ$ , with ground rim and long slender stems ground to a point. Length of stem, about 150 mm.

Diameter, mm..	25	40	50	65	75	90	100	125	150	175	200	225	250	300
Each	.25	.25	.30	.35	.38	.40	.40	.55	.70	.95	1.05	1.45	1.90	2.60

**6126. FUNNELS, Glass Ribbed**, for rapid filtering, of heavy moulded glass with smooth rim.

Diameter, inches	$3\frac{3}{4}$	$4\frac{1}{4}$	$5\frac{1}{4}$	$7\frac{1}{4}$	$8\frac{3}{4}$	$10\frac{1}{4}$	13
Capacity, ounces	4	8	16	32	gals. $\frac{1}{2}$	1	2
Each	.20	.25	.35	.50	.85	1.25	2.60

**6192. FUNNEL TUBES**, conical top, straight stem.

No.	A	B
Length, cm.	30	40
Each	.15	.19

**6194. FUNNEL TUBES**, thistle top, straight stem.

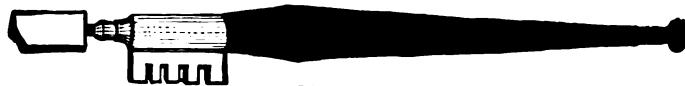
No.	A	B
Length, cm.	30	40
Each	.11	.12

**6196. FUNNEL TUBE**, thistle top, with bend in stem for safety trap. Length, 300 mm..... .18

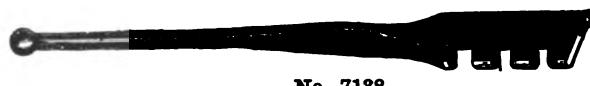
**6198. FUNNEL TUBES**, thistle top with bend and bulbs. Length, 300 mm.

No.	A	B
Number of bulbs	1	2
Each	.30	.40

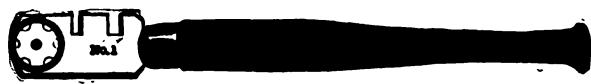
**6936. GAS MACHINES**, Matthews, for the automatic production of gas for laboratory use, where a source of natural or illuminating gas is not available. The machine consists essentially of a carburetor to contain the gasoline and supply the gas, an air pump or blower to furnish the air, an automatic mixer for producing the proper mixture, a weight which furnishes the



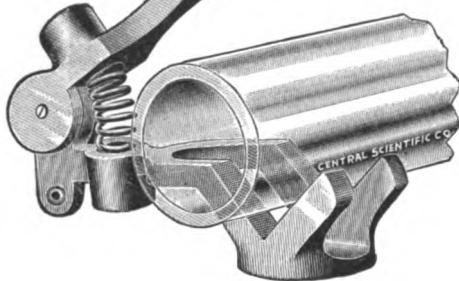
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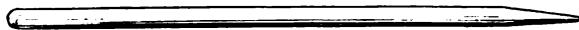
No. 7138.



No. 7140.



No. 7154.



No. 7182.



No. 7070.

**GAS MACHINES, Matthews, Continued.**

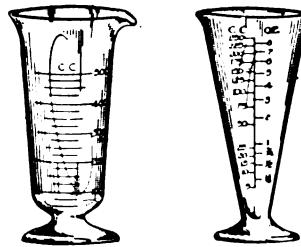
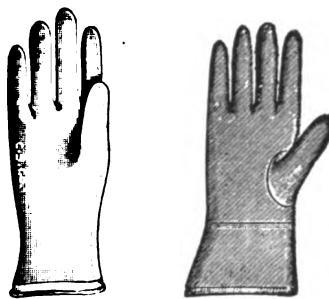
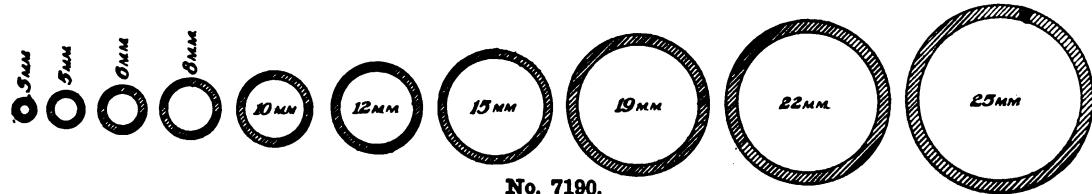
motive power for the air pump, and the necessary connections. The entire process is automatic, it being necessary only to wind the weight up once a day, and to fill the carburetor once or twice a year with gasoline. There is no danger in connection with this machine and no extra insurance required as it has been passed by the National Board of Underwriters. Complete as described with air pump, carburetor, mixer, pulleys, wire rope, weight holder and all necessary connections, but not including gas pipe.

No. ....	A	B	C	D	E	F	G	H
Number of burners.....	30	40	50	75	100	150	200	300
Capacity of carburetor, gals.	156	202½	252	315	375	437	512	770
Number of cells.....	2	2	3	3	4	4	4	4
Shipping weight, complete, including mixer, lbs.....	1150	1475	1600	2125	2525	2750	3000	3900
Each .....	\$280.00	335.00	375.00	430.00	525.00	635.00	750.00	975.00

7070. **GAS PRESSURE REGULATOR**, Murrill's, for delivering gas to a burner at constant pressure. Widely used with gas thermostatic regulators (See Nos. 13766 to 13786)..... 10.25  
 7136. **GLASS CUTTER**, Glazier's Diamond, for cutting or writing on glass. Handle nicely finished; metal parts nickel-plated. Diamond can be reset several times. Cuts single-thick glass. 6.00  
 7138. **GLASS CUTTER**, Steel Wheel, polished and bronze finish ..... .12  
 7140. **GLASS CUTTER**, Steel Wheel, having six cutting wheels in a turret head which may be revolved on or clamped to the frame. The cutters are protected when not in position for use.... .40  
 7141. **EXTRA CUTTING WHEELS** for No. 7140.....Per dozen .65  
 7154. **GLASS TUBING CUTTER**. The pressure on the cutting wheel may be regulated so as to be firm and even ..... 1.50  
 7155. **EXTRA CUTTING WHEEL** for No. 7154..... .10  
 7180. **GLASS ROD**, best quality lead free glass, in lengths of about five feet. From 3 to 13 mm in diameter. Diameters are subject to usual factory variations. Rod in smaller quantities than 5 pounds if desired in full lengths should be so specified, otherwise lengths convenient for packing may be sent. An additional charge will be made for selecting rod gaged accurately.  
     Diameter, mm..... 3 4 to 13  
     Per pound..... .75 .60  
     Please specify diameter in ordering.

7182. **GLASS RODS**, Stirring, with one end rounded, the other pointed.  
     Size, in..... 5x1/8 6x3/16 8x3/16 10x1/4  
     Per dozen..... .50 .60 .90 1.20

7184. **GLASS ROD**, soft glass, for sealing in platinum .....per pound 2.00



7190. **GLASS TUBING**, best soft glass, lead free, for glass blowing, bending, etc., in lengths of about five feet. Diameter and thickness of wall are subject to usual factory variations. An additional charge will be made for selecting tubing gaged accurately inside or outside. Tubing in smaller quantities than 5 pounds, if desired in full lengths, should be so specified, otherwise lengths convenient for packing may be sent. Orders for assorted tubing above 25 mm must be for 5 pounds or more; orders for assorted tubing from 13 to 25 mm must be for 2 pounds or more; from 3 to 12 mm for 1 lb. or more.

Diam. outside, mm.	3	5	6	8	10	12	15	19	22	25	32	35	38	43	50
Per pound.....	\$1.10	.60	.60	.60	.50	.50	.50	.50	.50	.50	.60	.80	.80	.80	.80

7192. **GLASS TUBES**, Annealed Ends. Glass tubes of large diameter are not satisfactory unless ends are annealed to prevent longitudinal cracking. We list below a few sizes but can supply any size desired. No. .... A B C D E F G H J K L M  
 Diameter outside, cm. 2.5 2.5 2.5 2.5 2.5 2.5 3 3 4 4 4 4  
 Length, cm ..... 30 60 75 100 120 150 100 120 45 60 90 100  
 Each ..... .40 .60 .70 .70 .75 .80 1.10 1.20 .90 1.10 1.70 1.75  
 No. .... N P Q R S T U V W X Y Z  
 Diameter outside, cm. 4 4 4.5 5 5 5 5 5 5 5 5 5  
 Length, cm ..... 110 120 100 20 30 38 45 60 75 90 120 150  
 Each ..... 1.80 2.00 2.50 .75 1.10 1.20 1.25 1.50 1.60 2.00 2.60 2.90

7240. **GLOVES**, Rubber, black, medium weight. Sizes 6 to 10. (Example: Kid Glove No. 8 takes Rubber Glove No. 10.) ..... per pair .75

7242. **GLOVES**, Rubber, tight fitting, made of thinnest pure gum, as used by surgeons in operating. Sizes 6 to 10. .... per pair 1.20  
Kindly give size of usual kid glove in ordering.

7246. **GLOVES**, Rubber, Acid Gloves, loose fitting, heavy, gauntleted.  
Sizes for women, 6 to 9. .... per pair 2.40  
Sizes for men, 14 to 15. .... per pair 4.00

7254. **GLUE**, Le Page's.

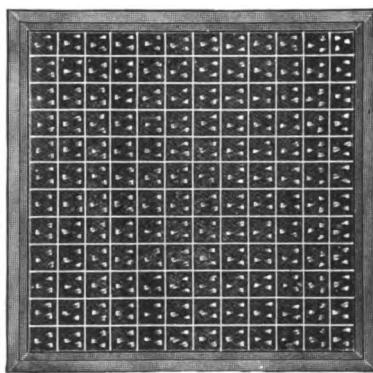
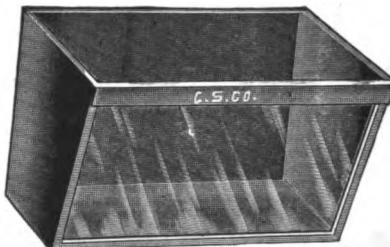
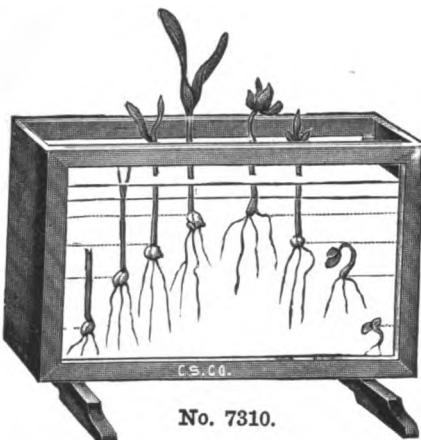
Size	Bottle	Can		
		4 oz.	8 oz.	1 lb.
Each	.20	.40	.60	1.00

**GRADUATES, Cylindrical, see Cylinders, Graduated.**

7292. **GRADUATES**, Glass, Cone Shape, metric measure.  
Capacity, cc ..... 20 60 100 200 250 500 1000  
Each ..... .40 .45 .50 .60 .65 1.00 1.70

7294. **GRADUATES**, Glass, Cone Shape, metric and English measure, double graduation.  
Capacity, ounces ..... 1 2 3 6 8 16 32  
Capacity, cc ..... 30 60 100 200 250 500 1000  
Each ..... .50 .55 .60 .80 .90 1.30 2.20

7296. **GRADUATE**, Glass, Cone Shape, new form, of heat resisting glass, permitting the use of hot liquids with minimum danger of breakage. The graduations are on the inside, being produced in such a way as to render them mathematically accurate. As the marks are in direct contact with the liquid, accurate adjustments are easily made. Graduated to 250 cc and to 8 ounces..... .75



No. 7322.

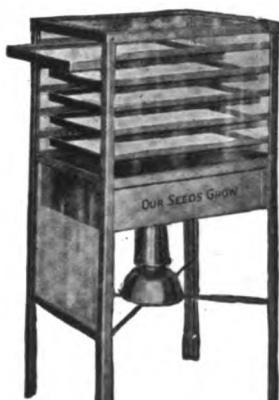
## GRAIN TESTING APPARATUS

**BALANCES**, Grain Testing, see general heading **Balances**.

**BALANCE WEIGHTS**, see **Balances**.

**BOTTLES**, Grain Sample, see Nos. 1756 and 1758.

7310. <b>GERMINATING BOX</b> for showing proper depth to plant seeds. Of galvanized iron 15 inches long by 8 inches high, with glass front and back $\frac{1}{4}$ of an inch apart, making it easy to observe the germination of seeds planted at different depths. Complete with metal shields to exclude light from the sides. (See Farmer's Bulletin No. 218 of the United States Department of Agriculture).....	\$5.00
7312. <b>GERMINATING BOX</b> , Ganong Pattern, for sprouting and observing root growths. Light, rust-proofed metal box with inclined glass front. Dimensions, 7 $\frac{1}{2}$ inches long, 5 inches deep, 5 $\frac{1}{4}$ inches wide at the top, 4 inches wide at the bottom .....	1.50
7314. <b>GERMINATING PLATE</b> , of heavy glazed earthenware, 10 inches in diameter. For holding moist blotting paper in germination experiments .....	.40
7316. <b>GERMINATING PLATE</b> , of porous clay, 9 inches in diameter. Obviates the use of blotting paper in germination experiments.....	.30
3592. <b>GERMINATING PLATE</b> , of porous clay, 4 $\frac{1}{2}$ inches in diameter by $\frac{1}{16}$ inch deep, with straight sides .....	.20
7320. <b>GERMINATING PLATE</b> , of graniteware, 11 inches in diameter by 1 $\frac{1}{4}$ inches deep. For use with moist blotting paper in germination experiments .....	.45
7322. <b>GERMINATING TRAY</b> , of water-proofed wood, 25x25x2 $\frac{1}{4}$ inches deep, for testing fertility of corn and other grain. A frame which fits into the tray is divided into 144 squares which may be numbered if desired.....	8.00
7324. <b>GERMINATING TRAY</b> , of wood, 18x10x2 inches deep .....	2.50
7330. <b>GERMINATION OR SPROUTING CUP</b> , as described in Bulletin No. 35 of the Rhode Island Experiment Station, and on page 14 of Bailey's "Nursery Book." Of porous clay 3 inches in diameter by 1 $\frac{1}{4}$ inches high, with ventilated cover and glass dish.....	.50



No. 7336.



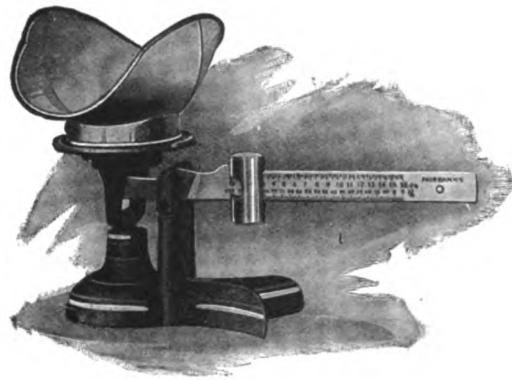
No. 7344.



No. 7346.



No. 7347.



No. 552.

7336. **GERMINATION TESTER**, Sho-Gro, oil heated, constructed throughout of non-rustable metal and glass. It has a capacity of 5 trays, each measuring 10x15 inches, so that a large number of samples may be accommodated at one time. The outside measurements over all are 32 inches high, 13 inches wide, and 17 inches deep. Since all sides are of glass, the progress of the test is always in view. Complete with 24 blotters, a supply of dividing strips and oil lamp for heating..... \$18.00

7338. **GERMINATION TESTER**, Sho-Gro, same as No. 7336, but electrically heated, with switch for three heats ..... 25.00  
In ordering, kindly state voltage of circuit.

**GRAIN CONTAINER** of galvanized iron, see **Bins and Containers**.

552. **GRAIN OR SEED SCALE (Dirt Scale)**, for ascertaining the percentage of dirt in grain or seed. The beam has two rows of marks, the upper indicating the weight, one pound by quarter ounces; the lower the percentage of dirt. In use a sample pound is weighed, sifted, and replaced in the scoop. The poise is then run back until the beam balances. The lower row of marks shows the percentage of loss by dirt removed, i. e., the percentage of dirt contained in the seed. Complete with brass scoop..... 12.50

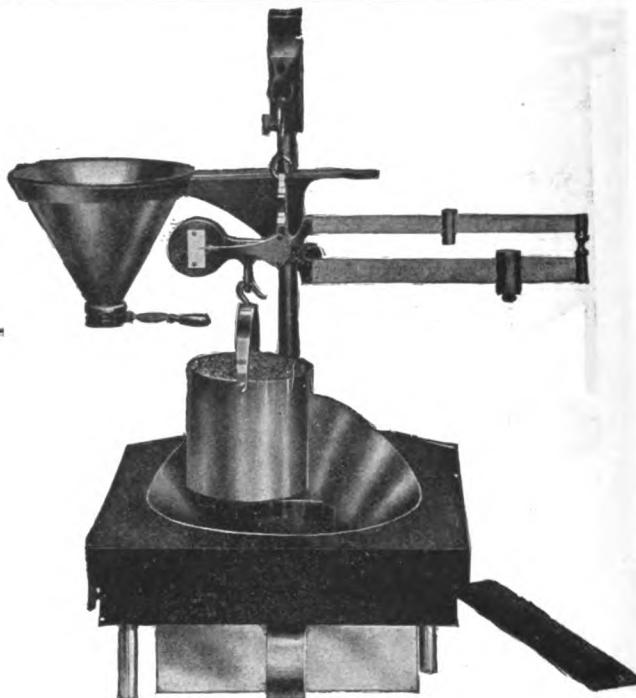
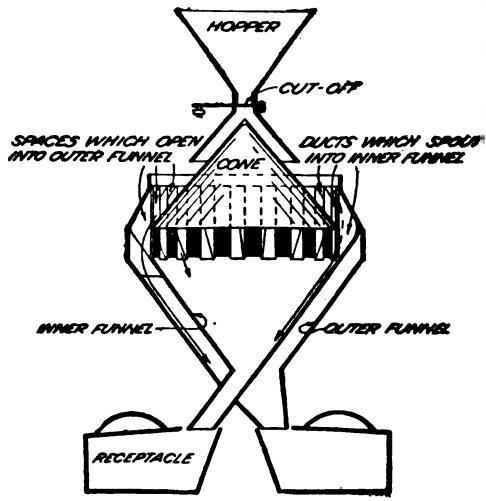
**GRAIN SPECIMENS**, see **Seed Specimens**.

7344. **GRAIN TESTER**, Grobecker's, of nickelized brass, for determining rapidly the farinaceous condition of barley and malt. Fifty kernels may be cut through at a time..... 12.00

7346. **GRAIN TESTERS**, of best construction, highly polished and lacquered. When the cup is empty the beam balances with the poise set at zero. Beam has three rows of graduations which indicate the number of pounds per bushel of sample, the exact weight of sample, and the percentage of loss in cleaning.  
Capacity ..... 1 pt. 1 qt. 2 qt.  
Each ..... 18.00 20.00 22.00

7347. **GRAIN TESTER FILLERS**, for use with No. 7346 Grain Testers. This device is of special value when accurate testing is desired, since it allows the grain to flow in a uniform stream and insures a uniform density in the cup. Complete with polished steel rod for striking off.  
Capacity, quarts ..... 1 2  
Each ..... 9.00 10.00

**Note:**—The above fillers may be used with any grain testers of capacity equal to or smaller than that of the filler.



7340. **GRAIN SAMPLER**, Boerner, designed by the U. S. Department of Agriculture to enable laboratory workers to secure a reliable sample of grain or seed from a larger portion. The device consists of a hopper through which the grain falls upon the peak of a large one. Spreading out upon the cone, half of the grain falls into the ducts at the base into the inner funnel, and passes out through one spout; the remainder passes through the outside funnel surrounding the cone and is delivered through the other spout. By running either half through a second time, and repeating, samples of any size may be secured, each of which contains the same material as any other. For complete description and directions for use, see Bulletin No. 287 of the U. S. Department of Agriculture.

Complete as described, constructed entirely of brass, with receptacles to catch the separated samples.

	A	B
No. ....	.....	.....
Height over all, inches.....	31	17
Diameter over all, inches.....	15	10
Number of divisions.....	36	36
Each .....	\$55.00	37.50

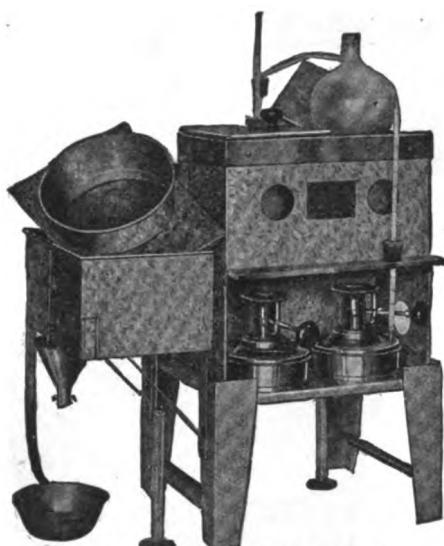
7350. **GRAIN TESTER**, Boerner, for obtaining the weight per bushel of grain accurately. This apparatus was devised by the U. S. Department of Agriculture for the purpose of standardizing the weight per bushel test and eliminating personal errors. The apparatus provides a means for filling the test pail always under the same conditions so that with the same grain results may be duplicated with a high degree of accuracy.

The outfit consists of a substantial hardwood base, upon which are mounted rods which carry the hopper and the weighing beam. A pan is provided to catch the overflow and a stroker for leveling off the grain. The base is provided with a metal plate, upon which the pail rests when receiving the grain, fitted with an adjustable guide for centering either a quart or pint tester.

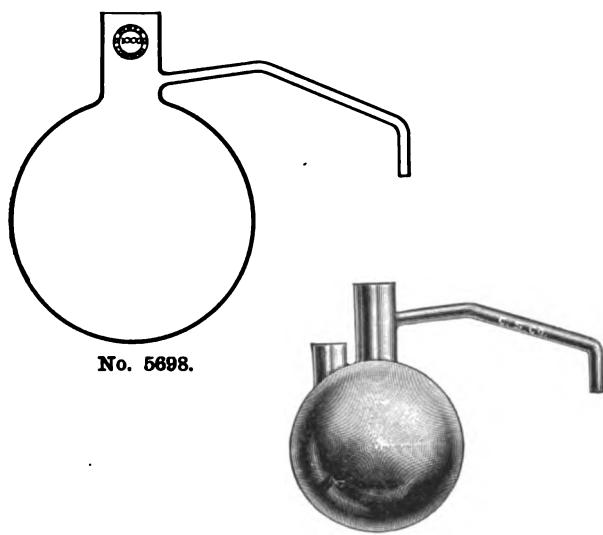
A special weighing beam is furnished with this outfit, each bar of which has three lines of graduations. The first line on the lower bar reads in pounds per bushel up to 60 pounds in divisions of 10 pounds; the second line reads up to 2 pounds in  $\frac{1}{2}$  ounce divisions and is used for determination of dockage; the third line reads in percentage of 2 pounds up to 100 per cent. in single divisions. The first line of graduations on the upper bar reads to 10 pounds per bushel by  $1/10$  pounds; the second line to 200 grams by 2 gram divisions; the third line reads in percentage of 200 grams up to 100 per cent. by single divisions. A poise is supplied on the lower bar with set screw to prevent sliding. For complete description and directions for use, see Bulletin No. 472 of the U. S. Department of Agriculture.

Complete as described, with quart pail and stroker ..... 80.00

7352. **GRAIN TESTER**, Boerner, similar to No. 7350 but smaller and of simplified design. This outfit is intended for use with any Bushel Tester such as our No. 7346. Complete with stroker, but without bucket or beam... .... 12.00



No. 7362 (including No. 7374).



No. 5704.

**MAGNIFIERS, for Grain, see general heading Magnifiers.**

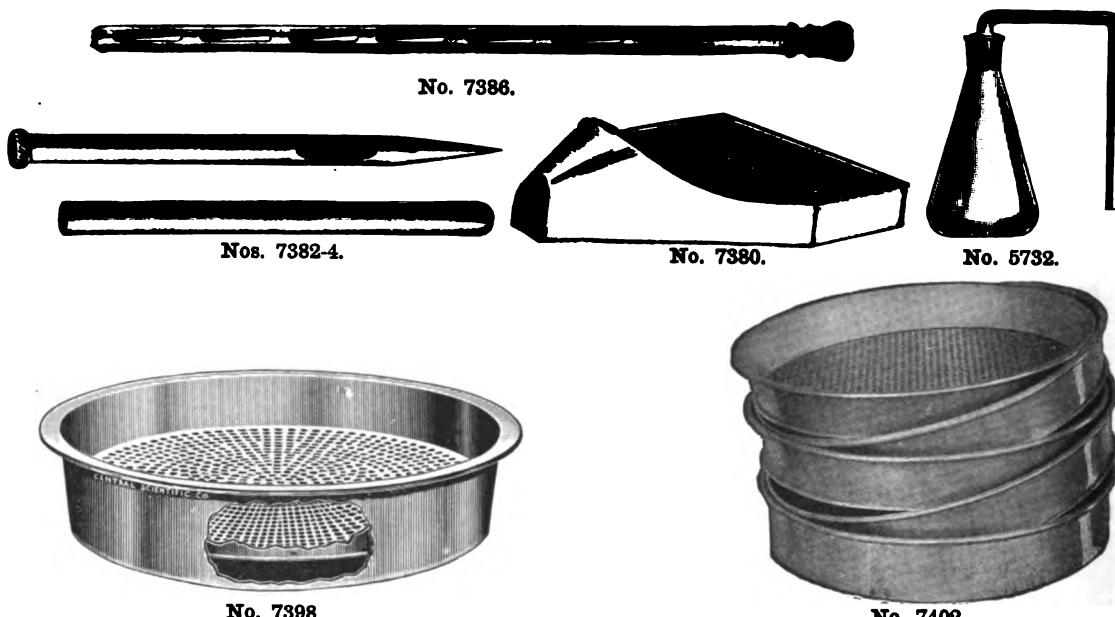
**MOISTURE TESTERS,** Official Brown-Duvel, developed primarily to meet the needs of grain dealers for a rapid and exact method of determining the moisture in corn. Methods have now been worked out for making moisture tests of the more important cereal grains and some of the more important seeds, as well as for flour and ground grain. The method is entirely practicable for making moisture determinations of practically all substances which admit of a free circulation of oil during the heating. The apparatus consists of a heating chamber divided into compartments for testing a number of samples at the same time; a cold water tank through which condenser tubes pass; burners; thermometers; special side neck flasks; graduated cylinders; and No. 7374 Automatic Oil Measuring and Grain Separating Device. Testers B, C and D are 12½ inches wide and 31 inches high. No. A is especially adapted for field work and is put up in a carrying case 11 by 7 by 15 inches; weight complete, 19 pounds. These testers are the standard form as specified in Paragraph 11 of the Federal Corn Grades, effective July 1, 1914. (See Bulletins Nos. 56 and 99, and Circular No. 72, Bureau of Plant Industry, United States Department of Agriculture.)

	No. ....	A	B	C	D
	Number of compartments.....	1	2	4	6
	Length, inches .....	6½	13	26	39
7360.	With gas burners.....	\$25.00	40.00	60.00	80.00
7362.	With alcohol burners.....	25.00	40.00	60.00	80.00
7364.	With electric heaters.....	30.00	50.00	80.00	110.00

Note:—In ordering No. 7364, kindly state voltage of circuit.

**Parts and Accessories for Moisture Testers.**

5698.	<b>FLASK</b> , Pyrex Glass, 1000 cc.....				1.50
5702.	<b>FLASK</b> , Copper, single wall, 1000 cc.....				3.50
5704.	<b>FLASK</b> , Copper, double wall, inner vessel 900 cc .....				6.00
7368.	<b>CONDENSER TUBE</b> , of glass.....				.30
3662.	<b>GRADUATED CYLINDER</b> , 25 cc, graduated in $\frac{1}{6}$ cc.....				.65
3664.	<b>GRADUATED CYLINDER</b> , new design; for use when 50 gram samples are being tested. With this graduate the percentage of water up to 16 per cent. is given by direct reading without the necessity of multiplying by two, as with the original graduate.....				1.00
7371.	<b>OIL</b> for moisture testers, according to the specifications of the Bureau of Plant Industry, in metal cans.				
	No. ....	A	B		
	Capacity, gallons.....	1	5		
	Each .....	1.00	3.25		
7372.	<b>RUBBER STOPPERS</b> , especially designed to stand the high temperature existing in moisture test flasks; are absolutely necessary when copper flasks are used.				
	No. ....	5	6		
	Per dozen.....	1.65	2.20		
7373.	<b>THERMOMETER</b> , graduated from 0° to 200° Centigrade, specially designed for moisture testers .....				2.00



7374. AUTOMATIC OIL MEASURING AND GRAIN SEPARATING DEVICE, consisting of a galvanized iron tank, re-enforced strongly with brass, and so mounted on brackets that it can readily be attached to any of the moisture testers; fitted with a measuring device which automatically measures out 150 cc of oil into test flask by merely pushing the neck of the flask upward against an automatic catch. The cover of the tank is fitted with a funnel-shaped sieve, which catches the mixture of grain and oil as it is poured from the flask after the test, and strains the oil into the container below. In this way the oil is kept free from dust and dirt, and the same oil may be used repeatedly ..... \$5.00

7380. PAN, Sample, of aluminum; for use in sampling and inspecting grains, with one end formed into a spout for pouring out contents. Strong, light, and well made; will not rust or tarnish; upward pitch of spout prevents grain from rolling out. Recommended in Bulletin No. 99 of the Bureau of Plant Industry. Size 8x12x1½ inches ..... 1.25

7382. SAMPLER, Bag, for sampling small seeds in sacks. Diameter, 7/8 inch; length, 4½ inches ..... 1.10

7384. SAMPLER, Bag, similar to No. 7382, but for grains. Diameter, ¾ inch; length, 6 inches... 1.50

7386. SAMPLERS, Grain, consisting of two polished brass tubes, one fitted inside of the other, and having openings matching each other. By turning the handle, the inner tube is revolved, thus opening and closing the holes.

No. ....	A	B	C
Diameter, inches.....	1 1/4	1 1/2	1 1/4
Length, inches.....	44	44	52
Each .....	8.00	9.00	10.00

7398. SIEVE, Corn Test, of aluminum, according to specifications of the United States Department of Agriculture, consisting of one sieve with 1 1/8 inch round holes and one bottom pan, nested, 13 inches in diameter by 3 inches deep..... per set 4.50

SIEVES, Wheat Dockage, according to Government specifications, consisting of a set of five sieves, 13 inches in diameter, and bottom pan, constructed of aluminum, telescoping. Consists of a buckwheat sieve with 5/16 inch triangular perforations; a fine seed sieve with 1/16 inch round perforations; a scalper sieve with 1 1/8 inch round perforations; a fine chess sieve with slotted perforations 0.064 by 3/8 inch; and a coarse chess sieve with perforations 4 1/2/64 by 1/2 inch. (See Regulatory Announcement No. 33 of Federal Wheat Grades Effective July 15, 1918.)

No. ....	A	B	C	D	E	F
Type of sieve	Buckwheat	Fine Seed	Scalper	Fine Chess	Coarse Chess	Bottom Pan

7401. Each ..... 2.25

7402. Per set of four, consisting of A, B, C, and E, with bottom pan..... 8.00

Note: Fine chess sieve No. D may be substituted for No. E in the set if desired.

#### SPROUTING MEDIA

7410. PROPAGATING SAND, best quality, clean and fertile..... per peck .50

7412. SAWDUST, for germinating trays, specially selected ..... per peck .25

7414. SPHAGNUM MOSS, best quality, for germinating boxes..... per pound .25

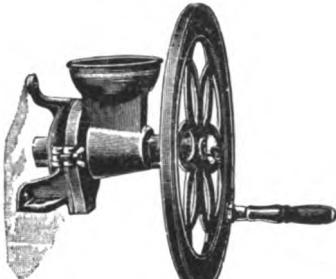
5732. SULPHUR DETERMINATION APPARATUS, for determining whether grain has been bleached, as recommended in Circular No. 111 of the United States Bureau of Plant Industry. Consists of an Erlenmeyer flask with ground in stopper and connecting tube. Capacity, 500 cc ..... 1.95



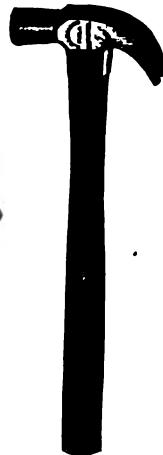
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No. 3512.



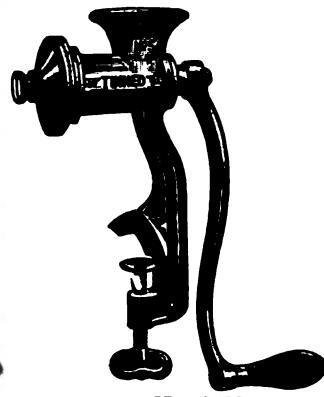
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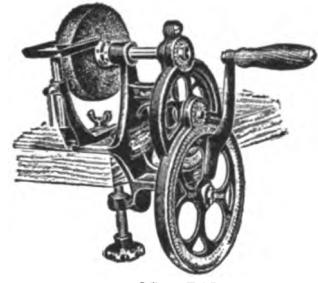
No. 7466.



No. 7422.



No. 3522.



No. 7424.

### GRINDING MILLS

**3510. GRINDING MILLS**, Laboratory and Drug, for hand operation, for grinding herbs, roots, grains, feed and other dry substances.

No.	2	3	5	7
Height, inches.....	12½	15	17	21½
Diam. of wheels, inches.....	8¾	10¾	12½	17
Weight, pounds.....	15	22½	36	62
Each .....	\$7.50	9.60	14.35	19.20

**3512. GRINDING MILL**, for hand operation, for bolting to table or bench. For pulverizing hard substances for analysis, such as ores, bone, etc. Grinding surfaces are made of very hard material. Diameter of hand wheel, 19½ inches; weight complete, 25 pounds..... 17.70

**3513. EXTRA GRINDING PLATES** for No. 3512..... per set 4.00

**3516. GRINDING AND PULVERIZING MILL**, for hand operation, for soils, grains, dry bone, limestone, rock phosphate, etc. Compact, strong, and durable. Height, 11 inches; length, 12 inches; width, 9 inches; dimensions of throat, 3x2 inches; diameter of handwheel, 19 inches; weight complete, 47½ pounds..... 15.00

**3518. GRINDING AND PULVERIZING MILL**, for power, same as No. 3516, but fitted with single pulley, 12x3 inches..... 18.00

**3520. GRINDING AND PULVERIZING MILL**, for power, same as No. 3516, but with tight and loose pulleys, 12x3 inches..... 25.00

**3522. GRINDING AND PULVERIZING MILL**, Nixtamal, for hand operation, for soils, herbs, grains, coal, dry bone, limestone, etc. Will pulverize limestone fine enough to pass through a 100 mesh sieve. Capacity (grain) 5 pounds per minute. Total weight, 24 pounds. Complete with three sets of grinding disks, coarse, medium and fine..... 20.00

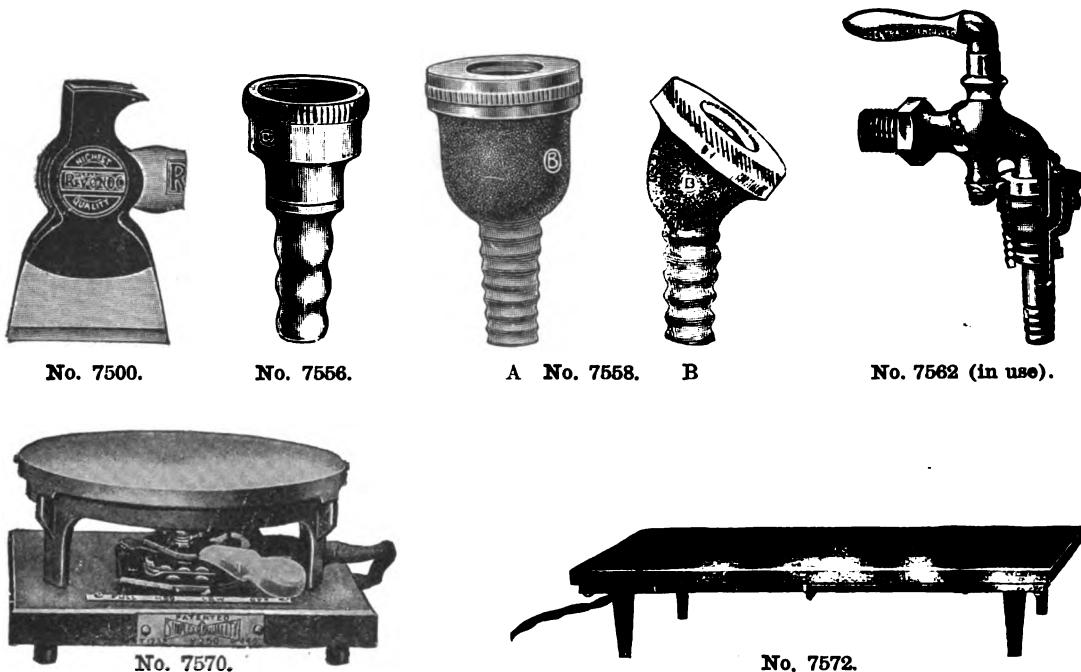
**7422. GRINDSTONES**. Selected Berea grindstones, rubbed smooth, mounted in a cast iron trough, with pressed steel base, steel shaft and steel ball bearings. Shipped knocked down.

Diameter, inches .....	6	10
Each .....	3.50	5.20

**7424. GRINDER**, with clamp for fastening to table 2 inches thick or less. High quality abrasive wheel 4 inches in diameter, 1 inch face; gears enclosed for protection..... 8.60

**7466. HAMMERS**, Claw, cast steel.

No.....	A	B
Weight, ounces .....	7½	13
Each .....	1.40	1.50



7500. **HATCHET**, high grade steel, black finish, polished face and bevel, selected white hickory handle, 3½ inch bit..... \$1.50

**HONES**, see Microtome Accessories.

**HOSE**, Rubber, see Rubber Tubing.

7556. **HOSE CONNECTOR**, brass, for rubber tubing, with thread for ordinary hydrant or kitchen bib. .... .75

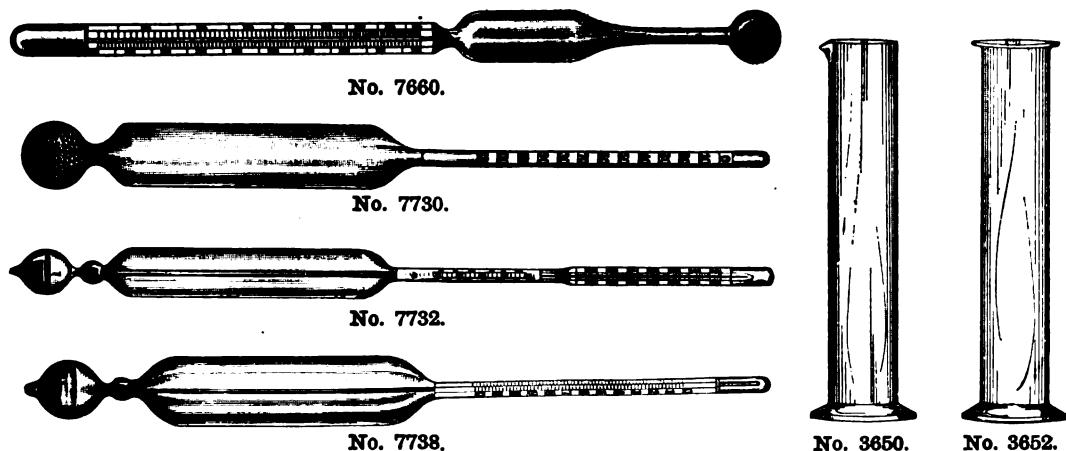
7558. **HOSE CONNECTORS**, brass, for smooth faucets. For ½ inch faucet.  
 No. ..... A B  
 Each ..... .70 .70

7560. **HOSE CONNECTORS**, brass, same as No. 7558, for ⅜ inch faucet.  
 No. ..... A B  
 Each ..... .80 .80

7562. **HOSE CONNECTOR**, Universal, not threaded, but merely slipped on a faucet and fastened with a chain. Can be quickly attached to any water faucet. The simplest device for attaching filter pumps, stills, water motors, turbines and centrifuges to a common faucet. It is practical, self-tightening and air tight..... 2.00

7570. **HOT PLATES**, Electric, round form, three heat, mounted on enameled slate base with regulating switch and furnished with six feet of cord, but without lamp socket plug except Nos. A and B. May be used on either alternating or direct current circuits.  
 No. ..... A B C D E  
 Diameter, inches..... 4½ 6 8 10 12  
 Power consumption, minimum watts..... 83 150 250 275 325  
 Power consumption, maximum watts..... 250 440 735 1100 1300  
 Each ..... 10.00 13.00 17.00 27.00 33.00  
 In ordering kindly state voltage.

7572. **HOT PLATES**, Electric, rectangular form, three heat, with 4 feet of cord but without lamp socket plug. Nos. A and B have three plug switches; C and D have snap switches.  
 No. ..... A B C D  
 Size, inches..... 9x12 12x18 18x24 4½x24  
 Power consumption, minimum watts..... 300 550 1000 150  
 Power consumption, maximum watts..... 880 1550 2800 600  
 Each ..... 27.00 45.00 67.00 26.00  
 In ordering kindly state voltage.



7658. **HYDROMETER, Combined Baumé and Specific Gravity Scales, for heavy liquids, ordinary grade,** graduated from 0° to 70° Baumé in 1° divisions, and from 1.000 to 2.000 specific gravity in 0.01 divisions. Length, about 11 inches..... \$0.60

7660. **HYDROMETER, Combined Baumé and Specific Gravity Scales, for light liquids, ordinary grade,** graduated from 100° to 10° Baumé in 1° divisions, and from 0.600 to 1.000 specific gravity in 0.005 divisions. Length, about 11 inches..... .60

7664. **HYDROMETER, Universal, Combined Baumé and Specific Gravity Scales for light and heavy liquids, medium grade,** graduated from 100° to 10° and 0° to 70° Baumé in 1° divisions; from 0.700 to 1.000 in 0.005 divisions, and 1.000 to 2.000 in 0.01 divisions. Length, about 15 inches .....

7670. **HYDROMETER, Acid, Specific Gravity Scale, medium grade,** for use in Babcock Milk test. Graduated from 1.800 to 1.850 in 0.001 divisions. Length, 6 inches..... .85

7724. **HYDROMETER, Lime Sulphur (Li-Sul-Sprayometer), Baumé and Specific Gravity Scales, medium grade,** New York and Pennsylvania pattern, for testing lime-sulphur wash used in spraying. Graduated from 0° to 38° Baumé, in  $\frac{1}{2}$ ° divisions, and from 1.000 to 1.350 specific gravity in 0.005 divisions..... 1.25

7726. **HYDROMETER, Lime Sulphur,** same as No. 7724, complete with 12x2-inch glass jar in wooden case with directions for use..... 1.50

7730. **HYDROMETER, Milk, Lactometer Scale, ordinary grade,** graduated from 0° to 120° in 2° divisions. Length, about 11 inches..... .65

7732. **HYDROMETER, Milk, Quevenne's Lactodensimeter, medium grade, with enclosed thermometer,** graduated from 14° to 42° (1.014 to 1.042 specific gravity) in 1° divisions. Length, about 13 inches .....

7734. **HYDROMETER, Milk, Quevenne's Lactodensimeter,** same as No. 7732, but without enclosed thermometer .....

7736. **HYDROMETER, Milk, Spence's Lactometer, New York State Dairy Commission Pattern, highest quality,** with enclosed thermometer, graduated from 0° to 120° in 2° divisions. Length, about 12 inches. With correction scale and certificate .....

7738. **HYDROMETER, Milk, Spence's Lactometer, New York State Dairy Commission Pattern, medium grade,** with enclosed thermometer, graduated from 0° to 120° in 2° divisions. Length, about 12 inches. With correction scale..... 4.00

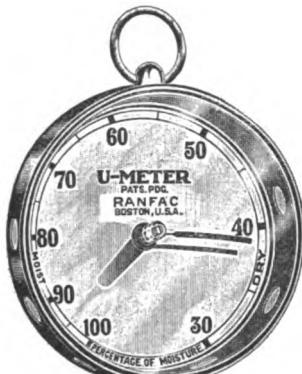
7740. **HYDROMETER, Milk, Lactometer, United States Department of Agriculture Dairy Division Pattern, Specific Gravity Scale, highest quality,** graduated from 24° to 37° (1.024 to 1.037 specific gravity) in  $\frac{1}{10}$ ° divisions. (See Bulletin 134 of the Bureau of Animal Industry, United States Department of Agriculture, page 16.)..... 5.40

3650. **CYLINDERS, Hydrometer Jars, of heavy glass, with lip.**  

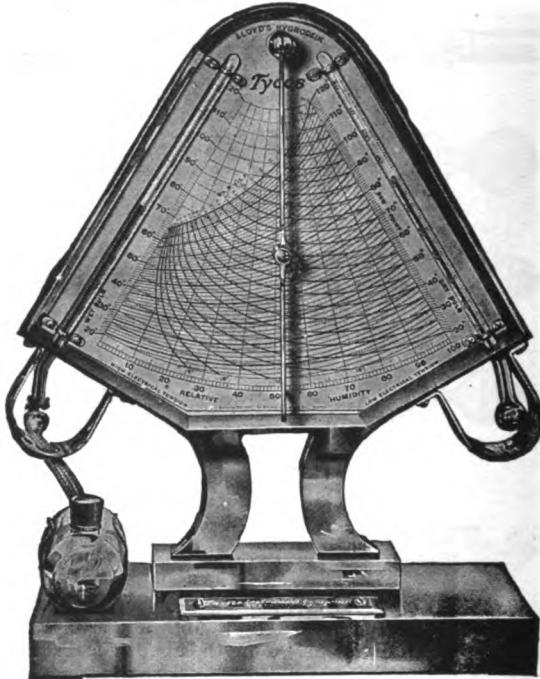
Size .....	B	C	D	E	F	G	H
Height, inches .....	6	8	10	12	15	15	18
Diameter, inches .....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	3	3
Each .....	.42	.46	.50	.56	.65	.90	1.25

3652. **CYLINDERS, Hydrometer Jars, of heavy glass, with flange.**  

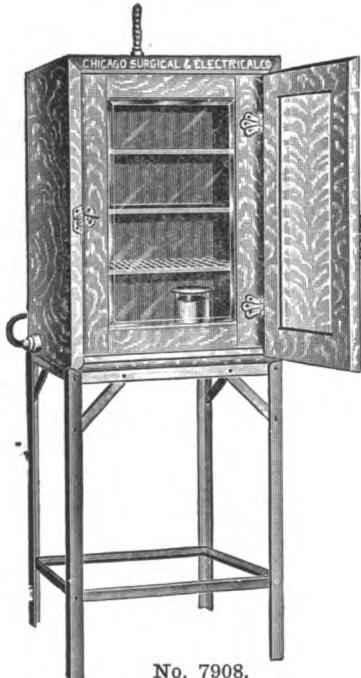
Size .....	B	C	D	E	F	G	H
Height, inches .....	6	8	10	12	15	15	18
Diameter, inches .....	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	3	3
Each .....	.46	.50	.55	.60	.68	1.05	1.40



No. 7808.



No. 7832.

No. 7908.  
Size No. 41.

No. 7876.

7808. **HYGROMETER, Simple Form**, for indicating approximately the amount of moisture in the air. In nickel-plated case  $2\frac{1}{2}$  inches in diameter and  $\frac{3}{4}$  inch deep, with beveled plate glass cover and celluloid dial graduated from 30 to 100 per cent..... \$3.00

7832. **HYGROMETER (Hygrodeik)**, an improved form of the Mason Hygrometer. Consists of two thermometers, wet and dry bulbs, mounted upon the outer edge of a chart which has been plotted from new and corrected tables prepared under the direction of the U. S. Weather Bureau. This chart, while complicated in appearance, is very simple and obviates entirely the use of tables for temperatures between 20 and 120 degrees Fahrenheit. Size of instrument  $10 \times 7\frac{3}{4} \times 3$  inches. Full directions furnished with each instrument..... 15.00

7876. **ICE CUTTING MACHINE**, with blades which cut the ice into pieces about the size of a pea. Size of opening,  $4 \times 6$  inches; height, 18 inches; space occupied,  $9\frac{1}{2} \times 9\frac{1}{2}$  inches; weight, 30 pounds .....

**INCUBATORS, Electric, Wood Frame**, with electro-thermostatic control.  
Construction: The walls are constructed of successive layers of transite, tar paper, animal hair, tar paper and five-ply wood, the latter consisting of quarter sawed oak over fibrous chestnut. The No. 1 Incubator, because of its small size, is sheathed with a solid wall of quarter-sawed oak  $\frac{1}{2}$  inch in thickness. The others all have the five-ply construction. By this construction, excellent insulation is secured, without danger of warping under the influence of heat or capillary moisture from inside the incubating chamber. The doors are provided with glass for observation of the contents, except in the larger sizes (Nos. 11-41), where an inner door of glass is provided with the entire outer door made of wood. The outer wall of quarter-sawed oak is finished in the natural color and highly polished.



No. 7946.

**INCUBATORS, Electric, Wood Frame, Continued.**

**Heating** is accomplished by means of incandescent carbon filament lamps, which heat quickly and cool quickly. The sizes of these are selected according to the cubic contents to be heated. If specified when ordered, the incubators can be furnished with wire wound electric heaters with pilot lights.

**Ventilation** is provided for by means of two holes in the smaller sizes, one near the bottom through which cold air enters, the other at the top through which the warm air escapes. In the larger sizes, there are four holes for entrance and escape of air, and the lamps are provided with chimneys for the purpose of creating air currents. In this manner, a constant air current is maintained.

**Regulation of the temperature** is effected by means of the electro-thermostat, which consists of a diaphragm of hard rubber and a metal disk riveted together. The difference in the expansion of the hard rubber and metal causes the former to become cup-shaped thus moving forward the center to which a platinum contact is attached. As the temperature is lowered the motion is reversed. By this means contact is alternately made and broken between two platinum points in circuit with the lamps, one attached to the diaphragm, the other to a thumb screw passing through the bridge across the thermostat, thus controlling the temperature. A condenser is provided by which the electric spark between the contact points is quenched, preventing the points from being quickly used up. The thermostat and condenser are mounted on a transite base.

Each incubator is furnished complete with 6 feet of connecting cord and plug for attachment to any lamp socket, Centigrade thermometer, and wire screen shelves.

## Shipping weight,

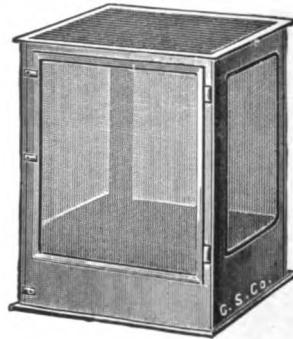
No. ....	1	2	3	11	12	13	31	32	33	.41
Height inside, inches .....	9	26	12	15	50	30	30	26	30	30
Width inside, inches .....	7	18	9	12	18	36	20	18	36	20
Depth inside, inches .....	7	18	9	10½	18	18	18	18	18	18
No. of shelves..	1	1	1	1	4	3	3	1	3	3
No. of lamps..	1	2	2	2	2	3	2	2	3	2
Candle power of lamps....	8	16	8	8	16	16	16	16	16	16
Doors .....	single	double	single	double	double, inner one di- vided	double, middle	double	double	double, in middle	double
Height of stand, inches .....	....	....	....	....	20	....	....	32	32	32
Shipping weight, lbs. ....	15	145	22	38	300	220	175	180	265	220
For 110 volts..	\$22.50	72.50	27.50	44.00	150.00	165.00	85.00	85.00	180.00	97.50
7908.										
7909.										
For 220 volts..	22.50	72.50	27.50	44.00	150.00	165.00	85.00	85.00	180.00	97.50
<b>INCUBATORS, Double Wall, with sheet iron base 9 inches high with opening on the side for burner, and with one shelf. Can be used satisfactorily as a paraffine oven.</b>										
No. ....								A	B	
Height inside, inches.....								10	12	
Width inside, inches.....								8	10	
Depth inside, inches.....								8	10	
Without heating equipment.....								70.00	80.00	
7946.										
7947.								83.50	94.60	
With gas heating equipment.....										



No. 7950.



No. 8000.



No. 8004.



No. 7984.



No. 7990.

No. 8012.

**INCUBATOR**, Double Wall, round form, for use where only a small number of cultures is handled at a time. Made of polished copper with a 2-inch water jacket, covered with an insulating material. Two covers are provided, the inner one of glass to permit inspection of the contents. With water gage, stop-cock for draining and perforated tray, mounted on sheet iron base 9 inches high with opening for Bunsen burner.

Height inside, 9 inches.

Diameter inside, 8 inches.

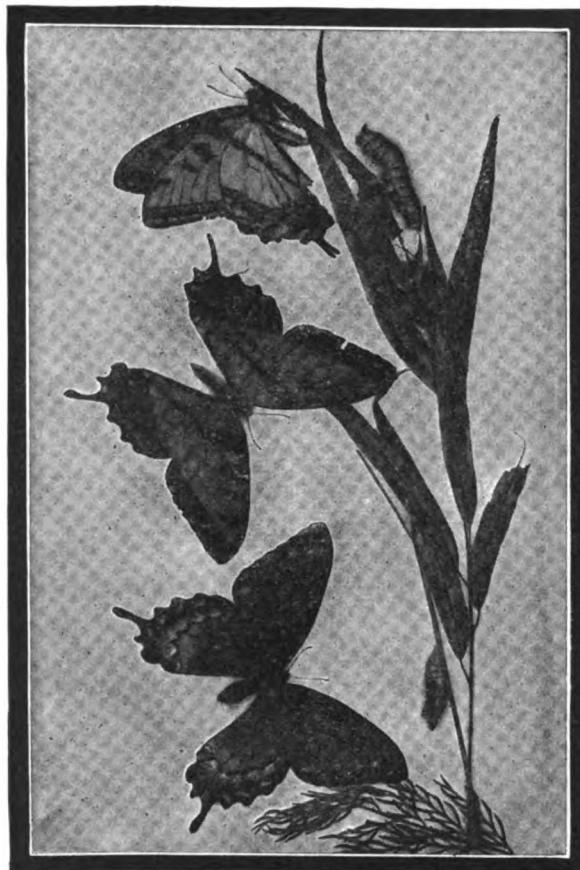
Height outside, 12 inches.

Diameter outside, 12 inches.

7950.	Without heating equipment.....	\$24.00
7951.	With gas heating equipment.....	33.00
7984.	INOCULATING NEEDLE, a platinum needle 40 mm long, of No. 28 wire, set in a glass handle .....	.80
7986.	INOCULATING NEEDLE, same as No. 7984, but with 80 mm of No. 27 wire.....	1.80
7990.	NEEDLE HOLDER, Inoculating, of brass, nickel-plated, with screw chuck for holding platinum or nichrome wire from No. 28 to No. 24 inclusive. Length, 160 mm. Without wire..	.30
	PLATINUM WIRE for No. 7990, write for prices.	
8000.	INSECT BREEDING CAGE, of zinc, glass front, with top, bottom and sides of wire gauze for ventilation. Top and bottom are removable. Size 5½x5½x10 inches high.....	7.00
8001.	TRAY of galvanized iron, water tight, for use with No. 8000 Insect Breeding Cage for aquatic insects .....	.60
8004.	INSECT BREEDING CAGE, all metal, non-corrosive, folding, easily adjusted. Top and sides of wire gauze for ventilation. Size 12x12x16 inches high.....	8.00
8010.	INSECT NET, with collapsible steel frame 13½x11¼ inches when open, and one piece bamboo handle 30 inches long.....	3.00
8012.	INSECT NET, similar to No. 8010, but with steel frame measuring 15x14 inches when open and with two-piece jointed handle 48 inches long .....	4.00
8018.	INSECT PINS, black, with round yellow heads; very stiff with sharp points, in packages of 100.	
	No. .00 .01 .1 .2 .3 .4 .5 .6	
	Per 100 .32 .32 .28 .28 .26 .26 .26 .26	
	Per 1000 2.70 2.70 2.20 2.20 2.20 2.20 2.20 2.20	
8020.	INSECT PINS, white, with round heads, in packages of 100.	
	No. .0 .1 .2 .3 .4 .5 .6	
	Per 100 .26 .26 .26 .26 .26 .26 .26	
	Per 1000 2.25 2.25 2.25 2.25 2.25 2.25 2.25	

**LIFE HISTORIES OF NORTH AMERICAN INSECTS**

Mounted dry in Eiker's Specimen Mounts. (See page 194 for prices of Mounts only.)



Illustrating Method of Mounting.

**NOXIOUS INSECTS****COLEOPTERA.****Beetles.**

A700.	<i>Doryphora decemlineata</i> , potato bug.....	\$3.00
A702.	<i>Anasa tristis</i> , squash bug.....	3.30
A706.	<i>Passalus cornutus</i> , horn bug.....	4.50
A708.	<i>Anthronomus grandis</i> , cotton boll weevil (Mexican) .....	3.60
A710.	<i>Saperda candida</i> , apple borer.....	3.30
A712.	<i>Conotrachelus nenuphar</i> , plum-curculio.....	4.20
A714.	<i>Diabrotica vittata</i> , striped cucumber beetle.....	3.30
A716.	<i>Dermestes lardarius</i> , larder beetle.....	3.30

**LEPIDOPTERA.****Butterflies and Moths.**

A740.	<i>Pieris rapae</i> , cabbage butterfly.....	3.30
A742.	<i>Euvanessa antiopa</i> , mourning cloak.....	3.60
A744.	<i>Carpocapsa pomonella</i> , codling moth.....	4.20
A746.	<i>Laphygma frugiperda</i> , fall army worm.....	3.00
A748.	<i>Leucania unipunctata</i> , army worm.....	3.00
A750.	<i>Ocneria dispar</i> , gypsy moth.....	4.20
A752.	<i>Protoparce carolina</i> , tomato sphinx.....	4.80
A754.	<i>Protoparce celeus</i> , potato or tobacco sphinx.....	4.80
A756.	<i>Sannina exitiosa</i> , peach borer.....	3.30
A758.	<i>Heliothis armigera</i> , boll-worm, corn worm or tomato worm .....	3.60
A760.	<i>Euproctis chrysorrhoea</i> , brown tail moth.....	3.60

Continued on next page.

**LIFE HISTORIES—Continued.****ORTHOPTERA.****Grasshoppers, Locusta, Etc.**

A780. <i>Termes fatalis</i> , white ant.....	\$3.60
A782. <i>Gryllus campestris</i> , field cricket.....	3.30
A784. <i>Gryllus domesticus</i> , house cricket.....	3.30
A786. <i>Gryllotalpa vulgaris</i> , mole cricket.....	3.30
A788. <i>Melanoplus spretus</i> , Rocky Mountain locust.....	3.30

**BENEFICIAL INSECTS****COLEOPTERA.**

A802. <i>Coccinella novempunctata</i> , ladybug.....	3.60
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**HYMENOPTERA.**

A810. <i>Apis mellifica</i> , honey bee.....	7.80
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**LEPIDOPTERA.**

A820. <i>Bombyx mori</i> , silkworm.....	4.20
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**MIMICRY****REAL MIMICRY.**

Butterflies that closely resemble in form and color species which birds and insects will not attack on account of the poisonous taste.

A830. <i>Limenitis dissipus</i> , same color and markings as <i>Danais archippus</i> , which is not molested.	2.10
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**PROTECTIVE COLORATION.****Mimicry of Color Only.**

A840. <i>Catocala relicta</i> ("white ribbon"), showing male and female, also one specimen at rest on birch bark .....	4.80
A842. <i>Catocala amatrix</i> ("red ribbon"), showin.....	3.00

**Mimicry of Color and Form.**

A850. <i>Kallima inachus</i> (leaf butterfly), mimicking a leaf to perfection in both color and form (from East India) .....	4.80
A852. <i>Anisomopha buprestoides</i> (walking-stick), from Florida .....	2.10
A854. <i>Phasma gigantes</i> (giant walking-stick), with wings, male and female (from East India) .....	12.00
A856. <i>Valgus candidulatus</i> and others. Three insects that imitate buds of twigs.....	3.00

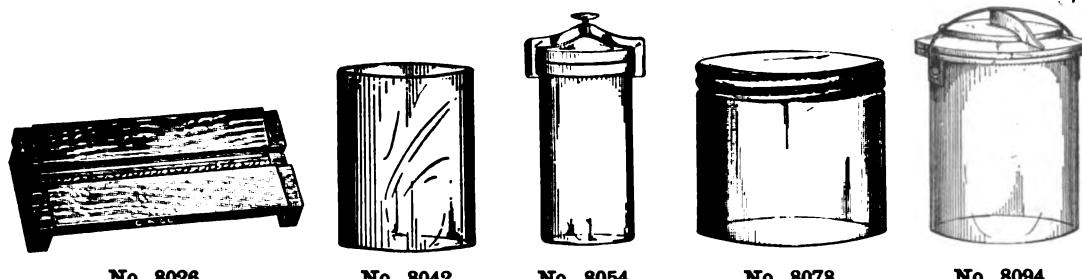
**WARNING COLORS AND FORM.**

A864. <i>Caligo oilius</i> (owl butterfly), mimicking an owl's head .....	5.40
A866. <i>Attacus atlas</i> (cobra-head moth), mimicking a snake's head.....	3.60
A868. <i>Papilio blumei</i> , green banded East Indian butterfly .....	3.60
A870. <i>Morpho cypris</i> , blue butterfly from Brazil, the most gorgeous butterfly in the world.....	4.20

(Note.—The last two butterflies scare away birds by their loud colors.)

**INSECTICIDES**

	4 oz.	8 oz.	1 lb.	Bulk.
Arsenate of Lead, dry.....	.25	.42	.70	5 lb. 3.40
Arsenate of Lead, paste.....	.20	.40	.60	5 lb. 2.90
Arsenate of Soda, dry.....	.15	.20	.25	5 lb. 1.00
Arsenite of Lime, dry.....	.16	.22	.30	5 lb. 1.25
Bordeaux Mixture, dry.....	.10	.18	.25	5 lb. 1.00
Carbon Bisulphide .....	..	..	.35	50 lb. 9.00
Cyanide of Potassium (for generating Hydrocyanic Acid Gas) .....	.25	.40	.65	5 lb. 3.00
Hellebore .....	.18	.30	.50	5 lb. 2.10
Kerosene Emulsion, per qt.....	.40	..	.15	1 gal. 1.25
Lime, Unslaked (Quicklime), lumps.....	..	..	.15	5 lb. .50
Lime, Unslaked (Quicklime), powd.....	..	.12	.20	5 lb. .90
Lime, Slaked .....	..	..	.10	5 lb. .40
London Purple .....	..	..	.65	.. ..
Paris Green .....	.23	.45	.80	5 lb. 3.75
Pyrethrum (Persian Insect Powder).....	.35	.60	1.00	5 lb. 4.75
Sulphate of Copper, powd.....	.14	.20	.35	5 lb. 1.50
Sulphur, powd.....	..	..	.10	5 lb. .30
Sulphur and Lime Mixture.....	..	.20	.30	5 lb. 1.25
Tobacco Stems .....	..	..	.10	5 lb. .25
Whale Oil Soap.....	..	.10	.15	5 lb. .65



No. 8026.

No. 8042.

No. 8054.

No. 8078.

No. 8094.

**8026. INSECT SPREADING BOARDS**, for use in drying insects preparatory to mounting. Consists of two strips of hardwood cleated together leaving a groove in the middle in which the body of the insect is placed while the wings are pinned to the two strips.

No.	A	B	C
Length, inches	12	12 $\frac{1}{2}$	16 $\frac{1}{2}$
Width, inches	4 $\frac{1}{8}$	3 $\frac{1}{8}$	7 $\frac{1}{8}$
Each	\$2.00	2.25	2.50

### JARS, ALL KINDS

**JARS, Animal**, see **Animal Holders**.

**JARS, Aquarium**, see **Aquarium Jars**.

**JARS, Mouse**, see **Animal Jars**.

**8042. JARS, Battery**, cylindrical form, of clear white glass, frequently used for aquaria and specimen work.

No.	A	B	C	D	E
Diameter, mm.	100	100	125	150	225
Height, mm.	100	125	175	200	300
Approx. capacity, cc.	1000	1200	2500	4000	14000
Each	.55	.70	1.05	1.25	3.10

**8054. JARS, Museum, or Specimen**, of clear white glass, with diameter of mouth same as that of body. With glass lid with rings for suspending specimens, rubber gasket for sealing, and metal clamp for fastening lid. Only those sizes shown in heavy type are carried in stock. Other sizes can be furnished on short notice.

No.	A	C	E	F	G	H	J	K	M	
Height, without lid, inches	4	8	6	8	12	18	8	12	18	
Diam. inside, inches	2 $\frac{1}{4}$	2 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	5	5	5	
Capacity, pints	1/2	1	1 $\frac{1}{4}$	2 $\frac{1}{2}$	4	6	5 $\frac{1}{2}$	8	12	
Each	1.30	1.44	1.90	2.00	2.40	2.85	3.65	4.32	5.00	
No.	N	P	R	S	U	V	W	X	Y	Z
Height, without lid, inches	8	12	8	12	18	24	36	2	18	24
Diam. inside, inches	6 $\frac{1}{4}$	6 $\frac{1}{4}$	7 $\frac{1}{8}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$				
Capacity, pints	8	12	12	18	28	36	56	36	58	80
Each	4.68	5.20	7.20	8.20	9.60	11.00	14.40	17.00	21.60	27.00

**8055. LIDS only for No. 8054.**

Diameter, inches	2 $\frac{1}{4}$	3 $\frac{1}{2}$	5	6 $\frac{1}{4}$	7 $\frac{1}{8}$	11 $\frac{1}{2}$
Each	.10	.20	.35	.50	.90	2.35

**8056. RUBBER GASKETS** only for No. 8054.....each .05 .15 .35 .40 .65 1.50

**8057. CLAMPS** only for No. 8054.....each .45 .55 .85 1.00 1.60 3.05

**8078. JARS, Sample**, glass, with metal screw cap; valuable for samples, etc.

Capacity, ounces	2	4	8
Per dozen	.65	.70	1.30

**8094. JARS, Specimen**, of clear glass with cover, clamping device and rubber gasket.

No.	A	B	C	D	E
Height, inches	2 $\frac{1}{2}$	3 $\frac{1}{8}$	3 $\frac{3}{4}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$
Diameter, inches	2 $\frac{1}{4}$	3	3 $\frac{1}{8}$	3 $\frac{1}{8}$	4 $\frac{1}{4}$
Capacity, ounces	4 $\frac{1}{4}$	8	9	14	23
Each	.17	.20	.25	.30	.40



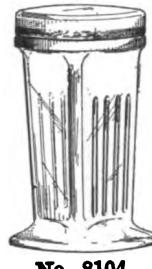
No. 8096.



No. 8098.



No. 8100.



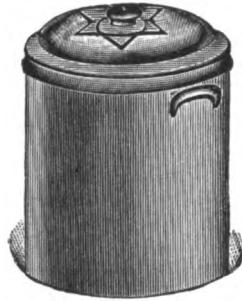
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No. 8106.



No. 8108.



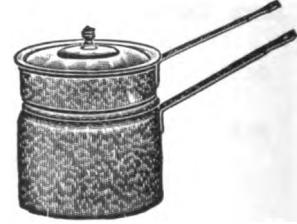
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No. 8114.



No. 8140.

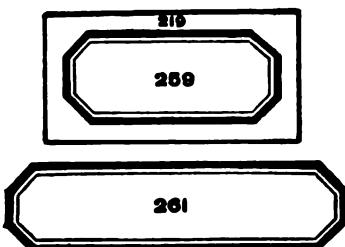


No. 8142.



No. 8146.

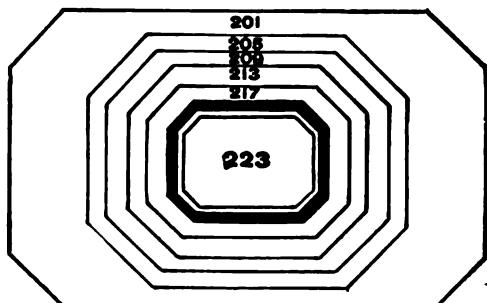
8096. JARS, Specimen, Calcutt's, made entirely of glass, so there is no danger of corrosion. A half turn of the cover renders the jar air tight.				
Capacity, pints.....		1	2	
Each .....	\$0.35	.45		
Per dozen.....	3.50	4.50		
JARS, Specimen, Inverted Show, see Bottles, Inverted Show.				
8098. JARS, Specimen, Mason's Fruit, with screw-lids and rubber gaskets for sealing.				
Size, quarts .....	½	1	2	
Each .....	.14	.15	.22	
Per dozen.....	1.40	1.50	2.20	
8100. JARS, Specimen, Sure Seal, with glass cover, metal clamping device and rubber gaskets.				
Size, quarts .....	½	1		
Each .....	.16	.18		
Per dozen.....	1.60	1.70		
8104. JARS, Staining, Coplin's, for ten 3x1-inch slides, with glass lid.....	each	.35		
	per dozen	3.50		
8106. JAR, Staining, Naples, of clear glass, with loosely fitting hemispherical cover. Height, 90 mm; diameter, 35 mm.....				1.00
8108. JAR, Staining, Naples, same as No. 8106, but with cork stopper, without glass cover....				.65
8112. JARS, Stoneware, with handles and covers for storing ordinary chemicals. Preferable to a galvanized iron can for refuse. Capacity, gallons...	½	1	2	4
Diameter, inches.....	5	6½	8½	10¼
Height, inches.....	5¾	8	8¾	10½
Each .....	.60	.60	1.00	2.00
			2.50	3.50
8114. JARS, Stoneware, with cover and nickel-plated metal stopcock, for storing distilled water, etc.				
Capacity, gallons.....	3	5	8	10
Each .....	2.85	3.75	5.50	6.00
				10.00
8120. JARS, Tumblers, Jelly, with cover, 200 cc capacity.....	per dozen	.60		
8140. KETTLES, Evaporating, graniteware, tin cover.				
Manufacturer's rated capacity, quarts.....		2	4	8
Each .....	.60	.90		1.30
8142. KETTLES, Infusion, double boiler, of graniteware, with tin cover.				
Manufacturer's rated capacity of inner kettle, quarts.....		2	4	8
Each .....	1.80	3.40		4.50
8146. KNIFE, Laboratory, good steel blade 4 inches long; round wood handle. Useful for cutting corks, etc. ....				.25



No. 8160.



No. 8164.



No. 8160.



No. 8166.



No. 8306.

**POTASS. CHROMIUM SULPHATE**  
CHROME ALUM.  
 $K_2Cr_2(SO_4)_4 + 24H_2O$ .

No. 8172.

8160. **LABELS**, Dennison's Gummed, rectangular shape with red border.

No. ....	201	205	209	213	217	219	223	259	261
Length, mm.....	64	42	37	30	27	38	21	33	52
Width, mm.....	40	34	28	24	20	19	17	14	14
Per box .....	\$0.10	.10	.10	.10	.10	.10	.10	.10	.10
Per carton of 12 boxes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

8164. **LABELS**, Dennison's Gummed, oval shape with red border.

No.....	229	239	241
Length, mm.....	42	27	21
Width, mm.....	30	17	14
Per box.....	.10	.10	.10
Per carton of 12 boxes.....	1.00	1.00	1.00

8166. **LABELS**, Dennison's Gummed, rectangular shape, large size, with red border, in boxes of 75.

No. ....	2001	2002	2003	2004	2005	2007
Size, inches .....	1 1/2 x 3 7/8	1 x 3 7/8	2 x 4 3/4	1 x 2 3/4	1 1/2 x 4 1 1/8 x 2 7/8	
Per box .....	.28	.23	.42	.19	.33	.25
Per carton of 12 boxes.....	2.85	2.30	4.20	1.90	3.30	2.25

8172. **LABEL BOOK**, containing labels for the most used chemicals and reagents, each label having name and symbol. Gummed, perforated, and arranged so that they may easily be removed without destroying the book. (Labels should be covered with melted paraffine after being put on the bottle, to protect them from acids, etc.) Book contains about 500 labels... .50

8276. **LENS PAPER**, Japanese, for cleaning lenses, in sheets 7x11 inches, in packages of 100 sheets. Per package..... .35

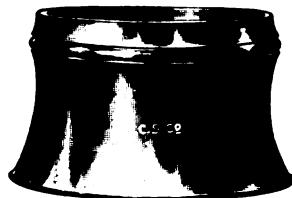
**LENSES**, Magnifying, see **Magnifiers**.

8306. **LIBRARY PASTE**, best grade.

No. ....	A	B
Style .....	Collapsible Tube	4-ounce Screw-Cap Jar
Each .....	.15	.15



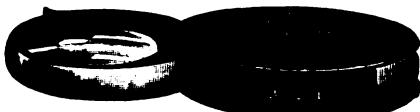
No. 8342.



No. 8344.



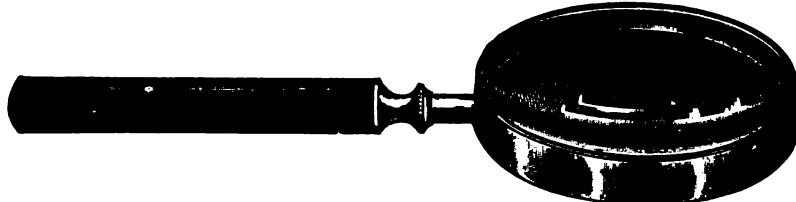
No. 8346.



No. 8348.



No. 8350.



No. 8356.

## MAGNIFIERS

**8342. MAGNIFIERS, Doublet**, consisting of two plano convex lenses in a metal mount, for use either as a hand magnifier or in dissecting microscopes.

No. ....	A	B	C
Magnifying power, diameters.....	6	9	12
Focal distance, mm.....	41.6	27.8	20.8
Focal distance, inches.....	1.6	1.1	0.8
Working distance, mm.....	22	15	12
Diameter real field, mm.....	22	16	11
Each .....	\$1.50	1.50	1.50

**8344. MAGNIFIER, Engravers' Glass**, the standard magnifier for use in counting colonies of bacteria. Magnifying power, 2.5 diameters. (See Public Health Report of the United States Public Health Service Vol. XXX, No. 33, August 13, 1915)..... 2.75

**8346. MAGNIFIERS, Linen Testers**, extensively used in elementary biology work, and for various other purposes where a small compact magnifier is desired. Folds up into very small space.

No. ....	A	B
Diameter of opening, inches.....	1/4	1/8
Magnifying power, diameters.....	10	10
Each .....	.80	.80

**8348. MAGNIFIERS, Pocket**, in folding mount of rubber and zylonite, very light and durable.

No. ....	A	B	C
Diameter of lens, mm.....	18	30	50
Magnifying power, diameters.....	5	3.5	2
Each .....	.85	1.20	2.00

**8350. MAGNIFIERS, Pocket**, same as No. 8348, but with double lens.

No. ....	A	B	C
Diameter of lenses, mm.....	15, 20	25, 30	37, 44
Magnifying power, diameters.....	5-12	3.5-8	2.5-5
Each .....	1.15	1.70	2.35

**8352. MAGNIFIERS, Pocket**, same as No. 8350, but with triple lens.

No. ....	A	B
Diameter of lenses, mm.....	12, 15, 18	15, 18, 20
Magnifying power, diameters.....	7-30	4-20
Each .....	1.70	1.80

**8356. MAGNIFIERS, Reading Glasses**, with nickeled rim and ferrule, and with black wooden handle.

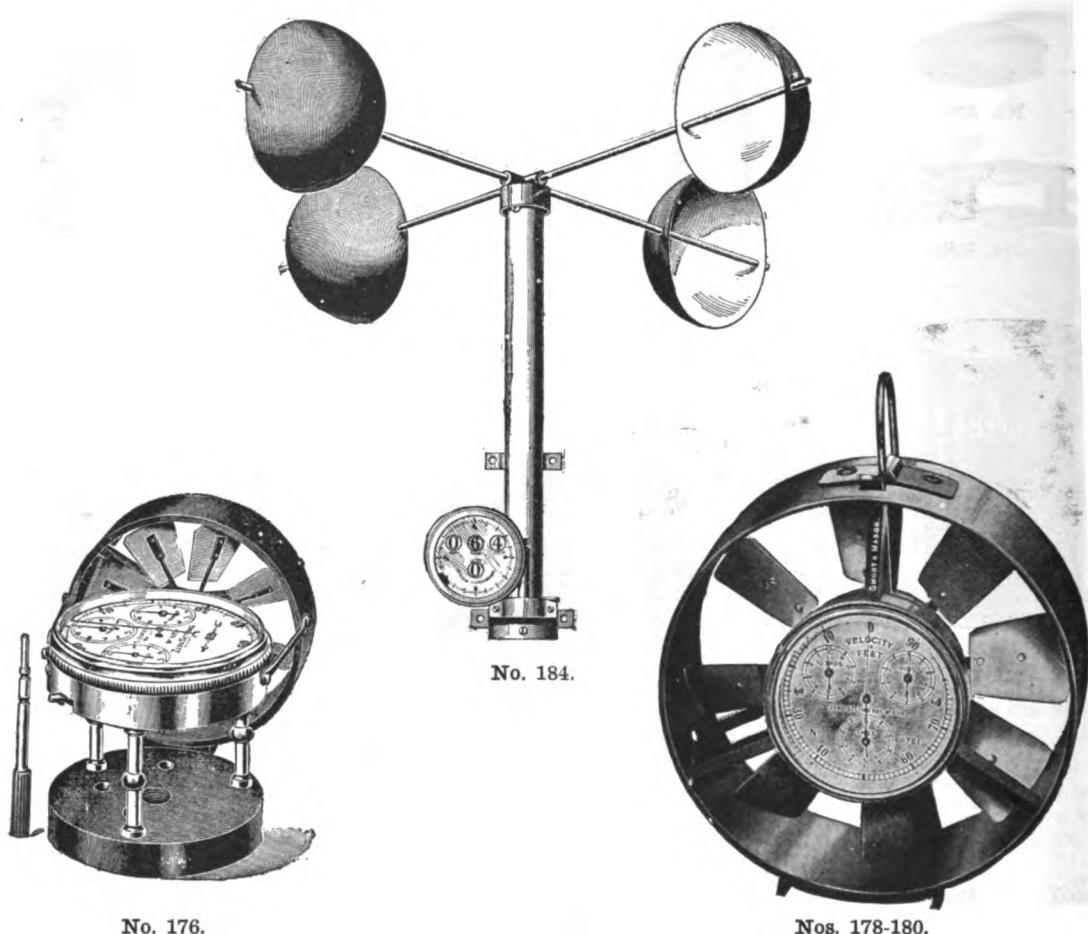
No. ....	A	B	C	D	E
Diameter of lens, inches.....	2	2 1/2	3	4	4 1/2
Focus, inches.....	5	6	7	10	12
Each .....	1.35	1.55	1.75	2.75	3.35



**MAGNIFIERS.** Triple Aplanat, the highest type of hand or dissecting magnifier. They are perfectly achromatic and free from distortion, have an extra long working distance, and furnish an unusually large, flat field.

No.	A	B
Magnifying power, diameters.....	9	12
Focal distance, mm.....	27.8	20.8
Focal distance, inches.....	1.1	0.8
Working distance, mm.....	24.5	18.4
Diameter real field, mm.....	20	15
8360. Mounted for use in dissecting microscopes.....	5.25	5.25
8361. Mounted in folding case for hand use.....	5.50	5.50
8364. <b>MAGNIFIER</b> , Tripod, giving a large, clear field and sufficient magnifying power for elementary botanical and zoological studies. The lens is focused by screwing up or down in the metal frame.....	1.00	
8366. <b>MAGNIFIER</b> , Watchmakers' Glass, double convex lens in vulcanite mounting. Diameter, 25 mm; magnifying power, 3 to 5 diameters.....	.80	
8368. <b>MAGNIFIER</b> , Watchmakers' Glass, consisting of two lenses of 12 and 25 mm diameter. The front lens (12 mm) can be removed by unscrewing, thus permitting the use of the rear lens (25 mm). Magnifying powers, 4 and 7 diameters .....	1.10	
8382. <b>MATCHES</b> , Swedish Safety, in packages of 12 boxes.....	Per package	.15
8390. <b>MEASURES</b> , Dry, Wood, iron bound. Set of 5 pieces, 1, 2 and 4 quarts, 1 peck, 1/2 bushel		2.00
8392. <b>MEASURES</b> , Liquid, Agateware, with spout and handle.		
Capacity, pints .....	1	2
Each .....	.60	.80
	1.00	1.50
8394. <b>MEASURES</b> , Liquid, Polished Copper, tinned inside, with spout and handle.		
Capacity, pints .....	1/2	1
Each .....	2.00	2.50
	3.30	4.10
		5.90
8396. <b>MEASURES</b> , Liquid, Tinned Iron, with spout and handle.		
Capacity, pints .....	1/2	1
Each .....	.25	.30
	.40	.60
		.90
8400. <b>MEASURES</b> , Liquid, Metric, polished brass, standard form.	A	B
No.....	C	D
Capacity, liters .....	E	F
Each .....	G	H
0.01	0.02	0.05
.40	.50	.60
.1	0.2	0.5
.70	.80	1.00
	1.30	2.00
8402. <b>MEASURES</b> , Liquid, Metric. Same as No. 8400. Set of seven pieces, 0.01 liter to 1 liter..	5.00	
8404. <b>MEASURES</b> , Liquid, Metric. Same as No. 8400. Set of eight pieces, 0.01 liter to 2 liters...	7.00	

Note: "Standard Form" is that in which the diameter equals half the height.



## METEOROLOGICAL INSTRUMENTS

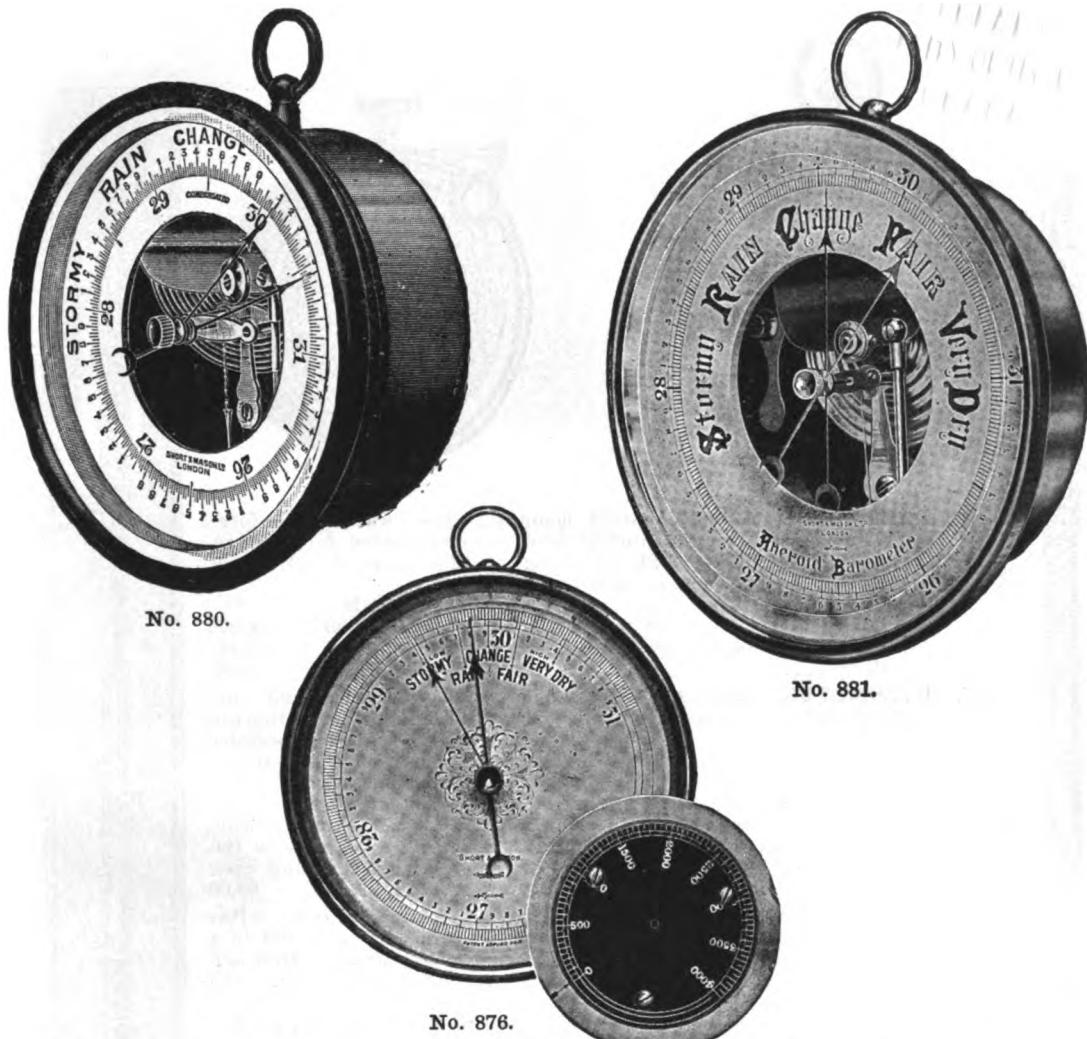
176. **ANEMOMETER, Portable Form**, for measuring the velocities of air currents in buildings, etc. Indications are obtained by means of a delicately poised fan wheel  $2\frac{3}{4}$  inches in diameter, running on jewelled bearings. The long hand indicates on the outer circumference of the main dial the passage of 100 feet or less of air. The readings are continued up to 100,000 feet by a series of smaller dials, as shown in the illustration. Complete with jointed socket holder, zero setting device and disconnector, in leather case ..... \$30.00

178. **ANEMOMETER, Biram's**, 3 inches in diameter, with 2 dials reading to 1,000 feet. Accurately made and finely finished, with jewelled bearings. Complete with zero setting attachment, in leather case ..... 25.00

180. **ANEMOMETER, Biram's**, same as No. 178, but with frame 4 inches in diameter, with four dials reading to 100,000 feet. Complete with zero setting device, in leather case..... 28.00

184. **ANEMOMETER or WIND GAGE**, for indicating the velocity of the wind in miles, consisting of a vertical shaft, to the upper end of which are fastened four arms, each carrying a Robinson hemispherical copper cup. These cups turn in one direction, regardless of the direction of the wind. The registering dial is so divided as to show velocities from one hundredth of a mile to 10,000 miles. All parts are interchangeable. Each instrument is standardized and fully warranted. Weight,  $3\frac{1}{2}$  lbs..... 35.00

185. **ANEMOMETER or WIND GAGE**, same as No. 184, but with electrical connections instead of dials, so that the velocity of the wind in miles per hour may be read at a distance or within the building upon which the instrument is mounted. Complete with push button, buzzer and battery, with framed directions for operating..... 45.00



No. 880.

No. 881.

No. 876.

**876. BAROMETER, Aneroid.** Sea Level Reading Type, with rearranged Weather Marks. This instrument is arranged in such a manner that it is suitable for use in any location from sea level to 3,500 feet elevation. The adjustment is very simple and no derangement of the working parts is necessary. Once adjusted for a given location by the observer, no further adjustment is required. A list showing altitudes of Meteorological Stations in the United States is furnished with each barometer, and also a simple weather forecast card.

To adjust the barometer for altitude for a given city, town or location, turn the brass plate set in the back of the case (this is easily done with the fingers) until the number of feet corresponding to the elevation of the city or town is opposite the arrow. The hand will then point to the proper weather mark and the reading will be the same as that of the U. S. Weather Bureau, which is Sea Level Reading.

Spun brass case, porcelain dial, 5 inches in diameter; adjustable stationary hand for marking the last position of the movable hand..... \$13.50

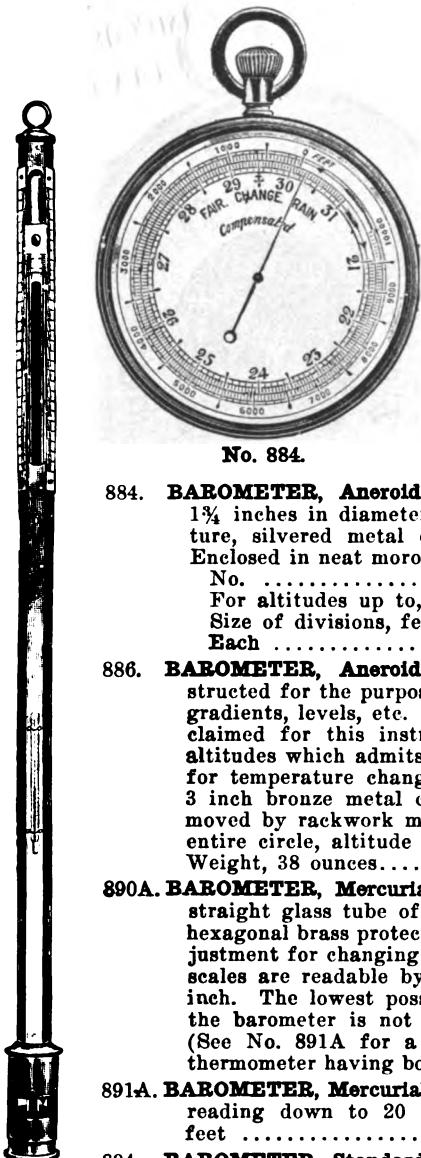
**877. BAROMETER, Aneroid.** Same as No. 876, but with dial graduated from 22 to 29 inches, for use in altitudes between 3,500 and 7,000 feet..... 15.00

**880. BAROMETER, Aneroid,** as adopted by the United States Navy. A brass case barometer of extra quality, with specially finished movement compensated for temperature, and silvered open metal dial graduated to 0.02 inches. For altitudes up to 3,500 feet. Without altitude scale. The best barometer of this style on the market..... 15.00

**881. BAROMETER, Aneroid.** Brass case, 5 inches in diameter; open porcelain dial; visible works. Graduated from 26 to 31 inches in divisions of 0.02 inch. For use in altitudes up to 3,500 feet..... 9.00

**881A. BAROMETER, Aneroid,** same as No. 881, but with dial graduated from 23 to 29 inches, for use in altitudes between 2,900 and 7,100 feet..... 10.25

**882. BAROMETER, Aneroid,** 4-inch card dial, open face, nickel-plated case. Graduations in both English and metric systems. For altitudes up to 3,000 feet. Without altitude scale... 7.25



No. 884.



No. 886.

**884. BAROMETER, Aneroid,** pocket mountain type, watch case form,  $1\frac{3}{4}$  inches in diameter, highest quality, compensated for temperature, silvered metal dial, revolving altitude scale, in gilt case. Enclosed in neat morocco case.

No.	A	B	C
For altitudes up to, feet.....	3,000	10,000	16,000
Size of divisions, feet.....	10	100	100
Each .....	\$21.25	20.10	22.50

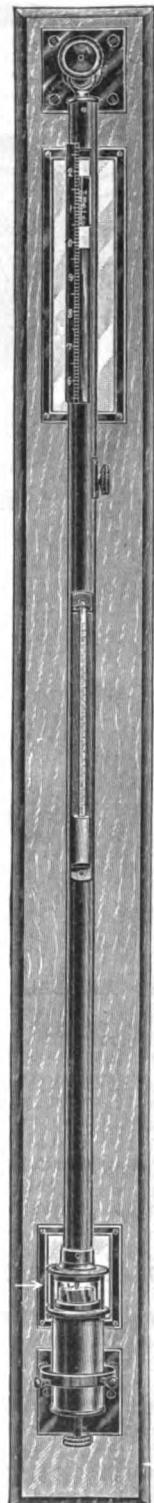
**886. BAROMETER, Aneroid, Surveying,** especially designed and constructed for the purpose of readily ascertaining slight variations in gradients, levels, etc. Besides extreme sensitiveness, the specialty claimed for this instrument is an arrangement of the scale of altitudes which admits of subdivisions by a vernier. Compensated for temperature changes and reads to two feet of altitude scale. 3 inch bronze metal case, silvered metal dial, with vernier scale moved by rackwork motion, reading lens arranged to traverse the entire circle, altitude scale 6,000 feet, in solid leather sling case. Weight, 38 ounces..... 63.00

**890A. BAROMETER, Mercurial, Cenco Improved,** Fortin Principle. Has straight glass tube of heavy wall and uniform bore mounted in a hexagonal brass protecting case, and is provided with a screw adjustment for changing the level of the mercury in the cistern. The scales are readable by means of a vernier to  $1/10$  mm and  $1/200$  inch. The lowest possible reading is 25 inches (63.5 cm), so that the barometer is not satisfactory for altitudes above 4,000 feet. (See No. 891A for a high altitude barometer.) Complete with thermometer having both a Centigrade and Fahrenheit scale. 25.00

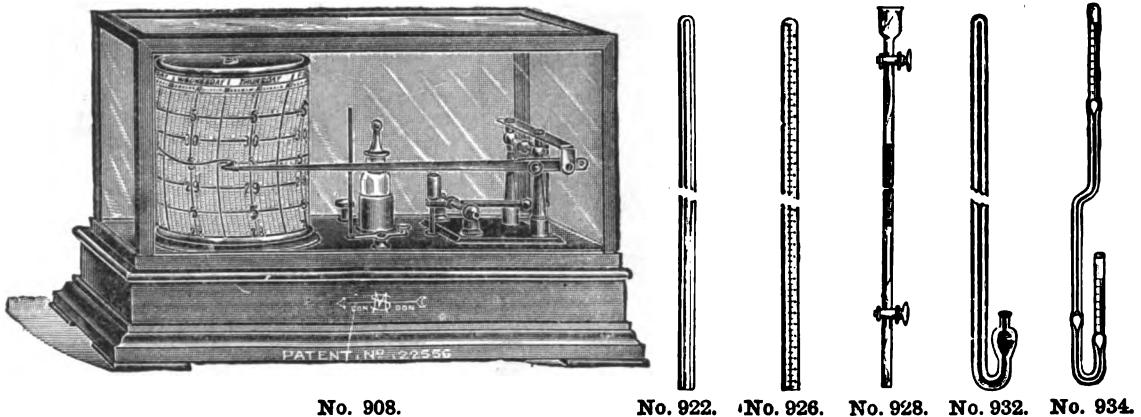
**891A. BAROMETER, Mercurial, Cenco.** Same as No. 890A, but with a scale reading down to 20 inches. For use in altitudes up to 10,000 feet ..... 30.00

**894. BAROMETER, Standard Mercurial, United States Weather Bureau Type,** Fortin Principle. This barometer is of the highest type of excellence, indorsed by the United States Weather Bureau and fully warranted by the manufacturer. The mercury tube is inclosed in a brass body with gun-metal finish, having at its upper end two vertical openings, in which the vernier works, the latter operated by a rack and pinion movement. The readings are taken through these openings, aided by light reflected from a white opaque glass reflector attached to the board behind. The scale is graduated on one side in inches and 10ths, and on the other in centimeters and millimeters, the vernier enabling a reading to be taken, in each case respectively, of one-thousandth of an inch and one-tenth of a millimeter. The attached thermometer consists of a well seasoned tube with both Centigrade and Fahrenheit scales, with the figures etched on the stem. It is so mounted that it can easily be removed for testing, etc. Reads down to  $25\frac{1}{2}$  inches and is therefore not satisfactory for altitudes above 3,500 feet.

Complete with board back of finely finished hardwood, to which is attached a brass bracket to receive the ring in the top of the barometer, a ring with steadyng screws to clamp about the cistern, and white opaque glass reflectors forming a translucent background for reading the instrument..... 75.00



No. 894.



895. <b>BAROMETER, Standard Mercurial, United States Weather Bureau Type.</b> Same as No. 894, but without the board back.....	\$67.50
896. <b>BACK</b> only of No. 894 Standard Barometer.....	7.50
898. <b>BAROMETER, Standard Mercurial, United States Weather Bureau Type.</b> Same as No. 894, but with a scale reading down to 20 in. for use in altitudes up to 10,000 feet.....	85.00
899. <b>BAROMETER, Standard Mercurial, United States Weather Bureau Type.</b> Same as No. 898, but without board back.....	77.00
900. <b>BACK</b> only of No. 898 Standard Barometer, described under No. 894.....	8.00
908. <b>BAROMETER, Recording (Barograph).</b> The movement is concealed in the base of the instrument and is worked by a large vacuum pan. In mahogany case, glass top and sides, and storage space for charts. Special charts, with instructions for weather forecasting are supplied. Complete with full directions for use, charts for a year, pen and ink.....	55.00
909. <b>BAROGRAPH CHARTS</b> , for No. 908 Barograph. In boxes containing one year's supply. ....	Per box 2.25
917. <b>BAROGRAPH CHARTS</b> , Style No. 2, for old style imported barographs reading 28 to 31 inches. In boxes containing one year's supply.....	Per box 2.25
918. <b>BAROGRAPH CHARTS</b> , Unfigured, but graduated for a 3 inch range. For old style imported barographs. In boxes containing one year's supply .....	Per box 2.25
920. <b>INK</b> , purple, for Barographs and Thermographs.....	Per bottle .50
922. <b>BAROMETER TUBE</b> , unfilled, large bore, thick wall, one end sealed. Length, 80 cm....	.37
924. <b>BAROMETER TUBE</b> , unfilled, same as No. 922, with glass mercury well and pipette for filling .....	.55
926. <b>BAROMETER TUBE</b> , unfilled, same as No. 922, but graduated in millimeters.....	2.50
928. <b>BAROMETER TUBE</b> , Demonstration Form, unfilled, with funnel top and with stopcock at top and bottom for easy filling and emptying of the tube. Total length, 104 cm. Graduated from 100 to 780 mm in millimeter divisions.....	8.00
930. <b>MERCURY WELL</b> , japanned iron. Capacity about 50 cc.....	.60
932. <b>BAROMETER TUBE</b> , Siphon Type, unfilled, with bulb on short arm. Length, 80 cm....	.75
934. <b>BAROMETER TUBE</b> , Siphon Type, Bunsen's, unfilled. Graduated at the top of each arm in millimeter divisions .....	4.50



Nos. 6480-2.



NO. 8510.



No. 8512.



No. 13032.

6480. **GAGE, RAIN**, similar to United States Weather Bureau type, but smaller. A zinc vessel 3 inches in diameter by 13 inches long, in the top of which is placed a copper cup having an open top exactly 3 inches in diameter with sharp edge and projecting rim. The bottom of this copper cup is open and fits in the top of a brass tube 1 inch in diameter in which the amount of rain is measured. This tube is provided with an overflow opening and a wood rule graduated for reading the rainfall directly to  $\frac{1}{100}$ th of an inch..... \$5.00

6482. **GAGE, RAIN, United States Weather Bureau Standard**, similar to No. 6480, but 8 inches in diameter and 23 inches long, with both inner and outer tubes of brass. Complete with measuring stick ....., 13.00

**HYGROMETERS**, see page 86.

8510. **METEOROLOGICAL SET, Universal**, a complete set of meteorological instruments suitable for a beginner, and of such a quality as to give satisfaction. The set comprises a 5 inch metal case aneroid barometer, 8 inch boxwood thermometer with F., R. and C. scales, 8 inch maximum and minimum (Six's) thermometer with magnet, 8 inch Mason's wet and dry bulb hygrometer with boxwood scale, 5 inch Howard rain gage, and a calendar for keeping a record of the instruments in the set. Packed in neatly finished box..... 40.00

8512. **METEOROLOGICAL SHELTER**. The latest pattern Weather Bureau Instrument Shelter. (Weather Bureau Bulletin No. 459.) Sufficiently large to hold Barograph or Thermograph and the two instruments shown in the cut. Made of best quality white pine wood, painted three coats lead paint, swing door with lock and key. Complete with screws for mounting. Shipped "knocked down"..... 35.00

13032. **SUNSHINE RECORDER**. This instrument records the duration and intensity of sunshine for twenty-four hours on a specially prepared photographic chart, which merely requires washing in cold water to become permanent. The chart being divided into hours, an exact record is thus obtained with the minimum of trouble. Complete with divided arc for adjustment of instrument to any latitude, with 100 charts and directions for use..... 28.00

13033. **EXTRA CHARTS** for No. 13032..... Per 100 3.50

**THERMOMETERS**, see general heading Thermometers.

14390. **WEATHER FORECAST CHART, or Key to Barometer Reading, and Chart for Aneroid Barometer**, by J. Benj. F. Rawson, late of the Weather Bureau. This chart is intended as an aid in the intelligent interpretation of barometer readings and in forecasting weather for twenty-four hours. This chart will be found quite accurate and most useful in any science laboratory. With full directions..... .50

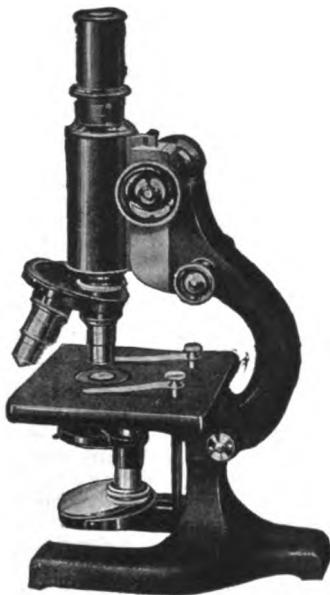
14392. "**WEATHER AND WEATHER INSTRUMENTS.**" This book describes the mechanism of the many instruments and in addition gives in concrete and simplified form the practical uses of the different instruments. The tables of classified data recommend it particularly to teachers. Pasteboard covers ....., .50

14393. "**WEATHER AND WEATHER INSTRUMENTS,**" same as above, cloth covers..... 1.10

14396. "**PRACTICAL HINTS for Amateur Weather Forecasters.**" Information on the care and exposure of barometers. 24 pages, illustrated ....., .10

## MICROSCOPES

We desire to advise our friends and patrons that we are agents for the celebrated Spencer Microscopes, manufactured by the Spencer Lens Company, and carry a complete stock of all Microscopes listed herein. The Spencer Microscopes are of recent design and contain many important features not possessed by any other microscope in the world. The Spencer lenses are guaranteed against all defects. We will be glad to send any one of the Spencer Microscopes to responsible persons for comparison, grade for grade, with any objective or stand of American or European manufacture, with the utmost confidence that the Spencer will be found to be unsurpassed by any and only equaled by few. We unhesitatingly recommend the Spencer Microscopes as representing better values than any other instrument on the market.



No. 8532.

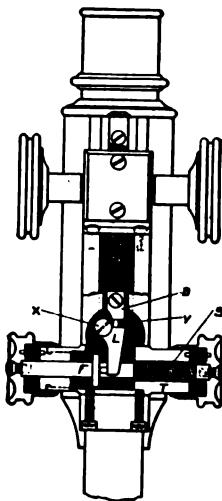


Diagram of Side Fine Adjustment "D."

**8532. MICROSCOPE, Spencer No. 44,** the most popular of all Spencer Microscopes. Many hundreds are in daily use in medical, educational and general laboratories.

The Body Tube is standard, taking standard objectives and oculars.

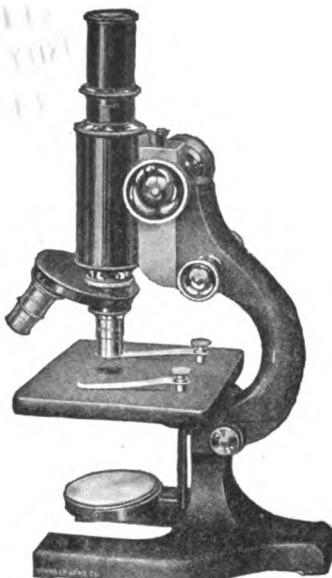
The Arm is strong and very graceful, fitted with the patented side fine adjustment "D," possessing many exclusive features. It has but two bearing surfaces and three working parts. The patented one-piece construction bearing carries the solid steel screw. This screw, with no less than twenty threads engaged even at the limit of its motion, has a heavy flange, F, working against the lever, L. When the screw is turned in such a direction as to carry F forward, the lever is so swung as to raise the body tube. The reverse motion permits the tube to be lowered under the influence of the spring. The focusing buttons at either end of this screw travel laterally and serve as a visible index of the center of the fine adjustment action. Steel pins in the heads form positive stops at either end of the excursion. The direction in focusing is the same with both fine and coarse adjustments. One revolution moves the tube 0.2 mm.

The Stage, 112x108 mm, is completely covered with hard rubber, vulcanized directly to the stage plate. Distance is 80 mm from optical axis to arm.

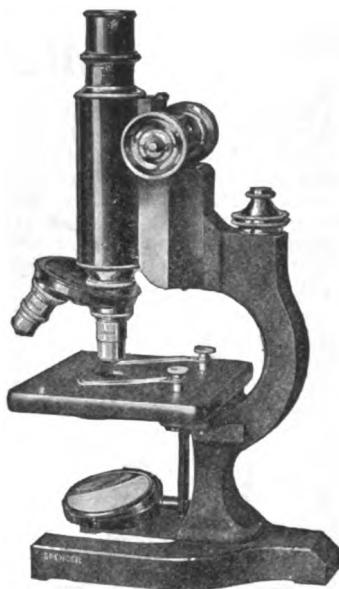
The Substage is standard quick-screw form.

The Down-Swing Condenser Mounting may be supplied at \$7.50 additional.  
Furnished in hardwood cabinet with lock and key.

No.	44A	44B	44C	44D	44E	44F	44H
Abbe condenser.....	....	....	....	....	N. A. 1.20	N. A. 1.20	N. A. 1.20
Nosepiece .....	....	double	....	double	double	double	triple
Objectives, equivalent focus, mm.....	16.4	16.4	16.4	16.4	16.4	16.4	16.4, 1.8 Oil imm.
Achromatic oculars..	10x	10x	6x, 10x	6x, 10x	10x	6x, 10x	6x, 10x
Each .....	\$55.50	60.75	57.50	62.75	70.75	72.75	110.00



No. 8536.



No. 8540.

**8536. MICROSCOPE, Spencer No. 64.** A standard microscope for general biology; used in hundreds of laboratories.

The Body Tube is our standard, 37 mm in diameter, taking standard objectives and oculars. The Arm and its side fine adjustment "D" are identical with those of Microscope No. 8532. This adjustment is patented, is exceedingly durable, will withstand very hard usage and not develop lost motion. (See description and diagram illustration under No. 8532.) It travels laterally, giving an instant visible index of the position of the adjustment relative to the total excursion. Steel pins in heads of buttons produce an absolute stop at either end of excursion, preventing jamming or binding of screw. There are but two bearing surfaces and three working parts. The main bearing is made of one single piece. One revolution moves the tube 0.2 mm. Adjustment ceases to work when objective comes in contact with slide. The Stage, 112x108 mm, is completely covered with hard rubber, vulcanized directly to the stage plate. Beneath the stage is an iris diaphragm operated by a knurled wheel, 62 mm in diameter. Abbe Condenser is supplied when ordered, and is fitted in a simple spiral focusing substage ring. Distance is 80 mm from optical center to arm.

Furnished in hardwood cabinet, with lock and key.

No.	64A	64B	64C	64D	64E	64F	64H
Abbe condenser.....	....	....	....	....	N. A. 1.20	N. A. 1.20	N. A. 1.20
Nosepiece .....	....	double	....	double	double	double	triple
Objectives, equivalent focus, mm.....	16.4	16.4	16.4	16.4	16.4	16.4	16.4, 1.8 oil imm.
Achromatic oculars ..	10x	10x	6x, 10x	6x, 10x	10x	6x, 10x	6x, 10x
Each .....	\$48.00	52.25	50.00	55.25	64.25	66.25	103.50

**8540. MICROSCOPE, Spencer No. 65.** This instrument is similar to No. 8536, except for the shape of arm and the type of fine adjustment. It is highly recommended for general laboratory work and is a very high grade microscope at moderate cost.

The Body Tube is our standard, taking standard objectives and oculars.

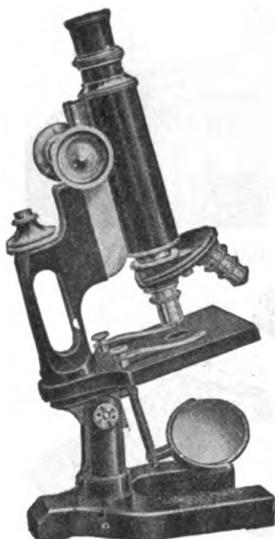
The Arm is fitted with the sensitive and accurate lever type fine adjustment. One revolution moves the tube 0.5 mm. The action ceases to work when the objective comes in contact with slide.

The Stage, 112x108 mm, is completely covered with hard rubber, vulcanized directly to the stage plate. Distance is 80 mm from optical axis to arm. Beneath the stage is an iris diaphragm operated by a knurled ring.

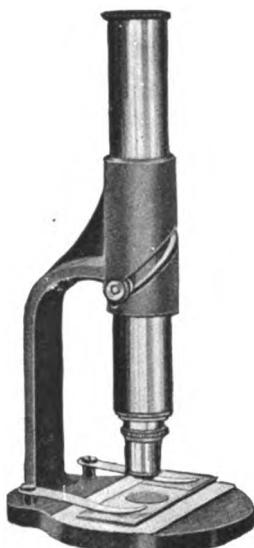
A Substage Ring, with spiral slot for focusing the Abbe condenser, is supplied when ordered or may be applied at any time without returning the microscope to the factory. An automatic device locks the upper iris open when condenser is in place. The standard mirror, 50 mm in diameter, plane and concave, is supplied on the usual swinging mirror bar.

Furnished in hardwood cabinet with lock and key.

No.	65A	65B	65C	65D	65E	65F	65H
Abbe condenser.....	....	....	....	....	N. A. 1.20	N. A. 1.20	N. A. 1.20
Nosepiece .....	....	double	....	double	double	double	triple
Objectives, equivalent focus, mm.....	16.4	16.4	16.4	16.4	16.4	16.4	16.4, 1.8 oil imm.
Achromatic oculars ..	10x	10x	6x, 10x	6x, 10x	10x	6x, 10x	6x, 10x
Each .....	45.00	50.25	47.00	52.25	61.25	63.25	100.50



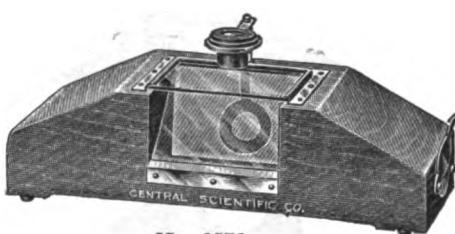
No. 8544.



No. 8560.



No. 8564.



No. 8572.

**8544. MICROSCOPE, Spencer No. 66.** An excellent instrument for general laboratory work. A splendid microscope at moderate cost.

The Body Tube is our standard, taking standard objectives and oculars.

The Arm is the handle arm type with lever fine adjustment "C." One revolution of the micrometer screw moves the body tube 0.5 mm. The action ceases to work when the objective comes in contact with slide.

The Stage, 103x95 mm, is completely covered with genuine hard rubber, vulcanized directly to the stage plate. Distance is 60 mm from optical axis to base of arm. The iris diaphragm is operated by a knurled ring just beneath the stage.

A Substage Ring, for attaching and focusing the Abbe condenser by means of a spiral slot, is supplied when the condenser is ordered or may be added at any time.

The Mirror is plane on one side, concave on the other, 50 mm in diameter, mounted on a swinging bar.

Furnished in hardwood cabinet, with lock and key.

No. ....	66A	66B	66C	66D	66E	66F	66H
Abbe condenser.....	....	....	....	....	N. A. 1.20	N. A. 1.20	N. A. 1.20
Nosepiece .....	....	double	....	double	double	double	triple
Objectives, equivalent focus, mm.....	16.4	16.4	16.4	16.4	16.4	16.4	16.4, 1.8 oil imm.
Achromatic oculars ..	10x	10x	6x, 10x	6x, 10x	10x	6x, 10x	6x, 10x
Each .....	\$45.00	50.25	47.00	52.25	61.25	63.25	100.50

**8560. MICROSCOPE, Demonstration.** With the exception of the tube, this stand is made entirely of aluminum, thus making it very light. This, with the convenient handle, makes it superior to all others for handing from person to person during class demonstrations. The objective is accurately and easily focused by a spiral movement which is so arranged that the objective may be securely fastened in any focus. The objective is always in sight, thereby being easier to focus, and to exchange for another. The slide is placed upon the stage as in any other microscope and there is no danger of disturbing the cover glass. Furnished with 8x eyepiece and 16 mm objective..... 17.00

**8564. MICROSCOPE, Dissecting, Barnes,** with hardwood polished base, movable glass stage, mirror, and two-lens magnifier. Fine screw and also sliding adjustment. Block is provided with pocket for holding dissecting tools..... 3.35

**8565. MAGNIFIER** only of No. 8564, without holder ..... 1.00

**8566. HOLDER** only of No. 8564, with vertical rod  $\frac{1}{4}$  inch in diameter..... .35

**8567. MAGNIFIER AND HOLDER** of No. 8564, complete ..... 1.35

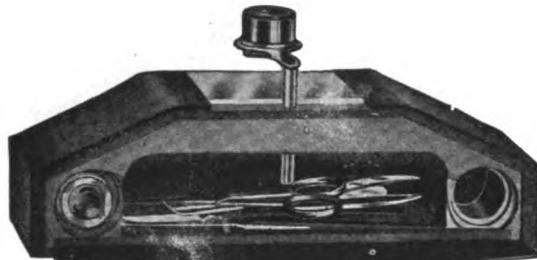
**8568. BLOCK** only of No. 8564 with mirror and stage, but without magnifier and holder..... 2.00

**8569. GLASS MIRRORS** only of No. 8564..... each .09 per dozen .90

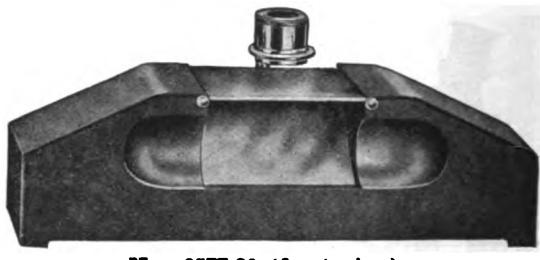
**8570. GLASS STAGES** only of No. 8564..... each .09 per dozen .90

**8572. MICROSCOPE, Dissecting,** same block as No. 8564, fitted with 12x Doublet Magnifier which gives perfect definition..... 3.80

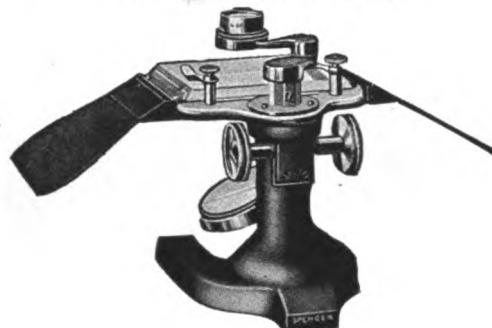
**Note:**—Other size Doublets may be furnished, if desired, in place of the 12x at the same price.  
**8573. HOLDER** only of No. 8572 for doublet magnifiers ..... .30



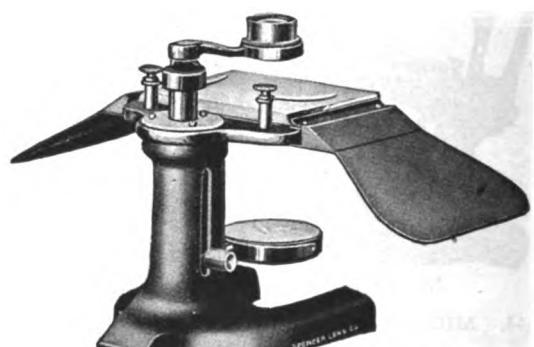
Nos. 8577-80 (rear view).



Nos. 8577-80 (front view).



No. 8584.



No. 8588.

**MICROSCOPE, Improved Dissecting.** The parts of the block at either side of the mirror are cut out to allow light from the sides to strike the mirror, thus doing away with the necessity of the operator facing the source of light in order that the light may strike the mirror. The block is hollow beneath and back of the mirror, forming a convenient receptacle for dissecting tools and lenses. This is closed by a door which is hinged at the lower edge of the block. This is most convenient because it is not necessary to remove the specimen from the stage or the lens from the holder when a new dissecting tool or lens is wanted. The lens is held in an arm which permits movement from side to side and provides for focusing. A black and white metal background is furnished with each instrument.

8577.	MICROSCOPE, Dissecting, with 9x Doublet .....	\$4.50
8578.	MICROSCOPE, Dissecting, with 12x Doublet .....	4.50
8579.	MICROSCOPE, Dissecting, with 9x Triple Aplanat .....	8.25
8580.	MICROSCOPE, Dissecting, with 12x Triple Aplanat .....	8.25

8584. **MICROSCOPES, Spencer Dissecting.** An extremely well made, thoroughly serviceable and convenient instrument at a very moderate cost. It is made with special reference to stability, ease of manipulation and durability. The focusing is accomplished by diagonal rack-and-pinion, moving a solid brass rod, whose bearings provide great steadiness and a very smooth movement of long range, so that lenses of long focus may be used. Two milled pinion heads allow either hand to be used in focusing. An extra large stage is provided, covered with a heavy polished glass plate, 75 mm x 100 mm, easily removed. The jointed lens arm permits the lens to be used over any part of the stage. Plane and concave mirror is furnished. The hand rests are of metal, detachable. In hardwood cabinet.

No. ....	A	B	C	D
Number of lenses.....	1	2	1	2
Type of lens.....	doublet	doublet	triple aplanat	triple aplanat
Magnifying power, diameters.....	9	6, 12	9	6, 12
Equivalent focus, mm.....	27.8	41.6, 20.8	27.8	41.6, 20.8
Working distance, mm.....	15	22, 12	24.5	36.8, 18.4
Each .....	13.50	15.00	17.25	22.50

8588. **MICROSCOPES, Spencer Dissecting,** similar in construction to No. 8584, with the exception that instead of the rack-and-pinion focusing adjustment it is equipped with a friction sliding tube adjustment. A button at the side of the pillar moves a strong cylindrical lens arm support, whose bearings extend the whole length of the inner surface of the hollow pillar, giving a steady, smooth movement. Without hand rests, in hardwood cabinet.

No. ....	A	B	C	D
Number of lenses.....	1	2	1	2
Type of lens.....	doublet	doublet	triple aplanat	triple aplanat
Magnifying power, diameters.....	9	6, 12	9	6, 12
Equivalent focus, mm.....	27.8	41.6, 20.8	27.8	41.6, 20.8
Working distance, mm.....	15	22, 12	24.5	41.6, 20.8
Each .....	9.00	10.00	12.25	16.50

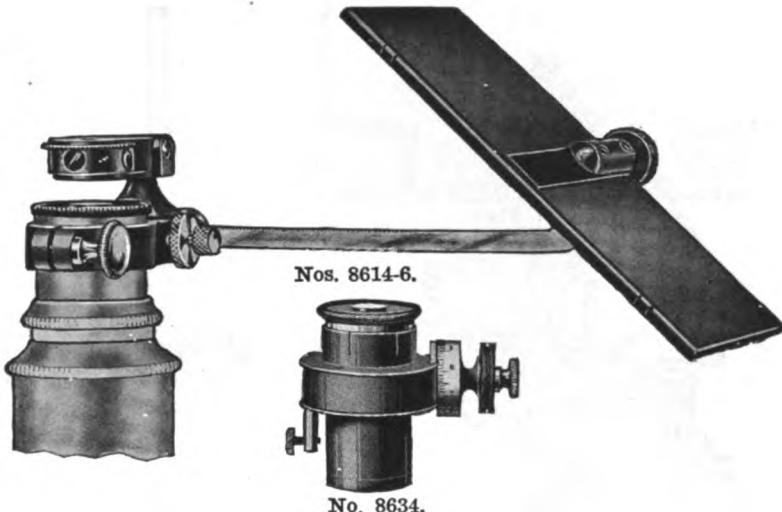
8589. **METAL HAND-RESTS** for use with No. 8588 .....per pair .75



No. 8610.



No. 8630.



No. 8634.

## MICROSCOPE ACCESSORIES

(Alphabetically Arranged.)

8610. **ABBE SUBSTAGE CONDENSER.** In order to secure the best results with objectives of high power, an Abbe Condenser must be used. The condenser illustrated has an aperture N. A. 1.20 and meets all the requirements of practical work. It is fitted with an iris diaphragm beneath to modify the amount of light, and is also provided with a ring beneath the iris to hold a blue glass for cutting out the yellow rays of artificial light; or to hold a center stop which to some extent will provide dark field illumination. The mounting is like the cut for the friction collar substages or is swung on the arm of the down-swing condenser mounting..... \$10.00

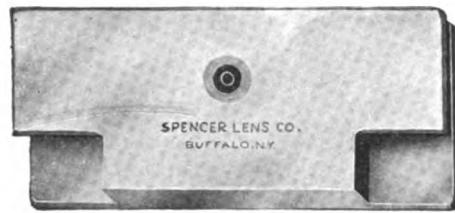
8614. **CAMERA LUCIDA,** Abbe's, designed to satisfy the demands of the serious laboratory worker. It has a very large mirror, 70 mm x 105 mm, which is supported on adjustable, graduated mirror bar. Its unique, compact mounting makes it possible to place the eye sufficiently close to the prism so that the pupil takes in all of the divergent rays coming from the whole of the field of the ocular, making the field appear as large and the object very nearly as distinct as when viewed without the camera. The prism is so mounted that the opening in the silvering can be lowered in the case of the higher power oculars, or raised with the lower powers until it comes to the exact focus of the ocular. The prism can be so centered by two concentric screws that the field is free from color to the extreme edge. The light from it is modified by a series of smoked screens of different densities which may be revolved in and out of line between the mirror and the prism. It is made for the standard size microscope tubes, now in use by practically all American and European makers. Complete in hardwood case ..... 25.00

8616. **CAMERA LUCIDA,** same as No. 8614, with the exception that the prism is permanently centered at the factory and that there is no means for modifying the light from the ocular. The prism is the same size and mounted in a similar way. There are no loose parts to get out of place when the prism is moved in and out of the optical center. Complete in hardwood case ..... 15.00

8630. **EYEPieces, Huyghenian.** In arranging the focal distance of the Spencer eyepieces, the method has now been adopted of marking them with figures that indicate in each case how many times the eye-piece enlarges the objective image, projected the distance of distinct vision (250 mm or 10 inches). For example, the 4x eyepiece magnifies the objective image four times, and the magnification of the 8x eyepiece will be twice as great under similar conditions. A 10x ocular now takes the place of the old 8x and a 5x takes the place of the 4x, the old designation being based on the magnifications of the image projected the distance of the optical tube length, 160 mm. The eyepieces are made to fit the standard tube of the Royal Microscopical Society.

No.	A	B	C	D	E	F
Magnifying power, diameters.....	4	5	6	8	10	12
Equivalent focus, mm.....	62.5	50	40	30	25	20
Equivalent focus, inches.....	2 $\frac{1}{2}$	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1	$\frac{1}{2}$
Each .....	2.00	2.00	2.00	2.00	2.00	2.00

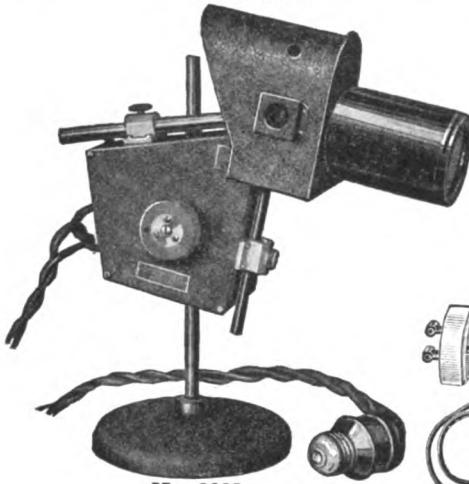
8634. **EYEPiece, Micrometer,** with movable scale 5 mm in length, divided into  $\frac{1}{4}$  mm divisions. The graduated drum, divided into 100 divisions, moves the scale  $\frac{1}{4}$  mm for each revolution, thus permitting readings to be made to  $\frac{1}{400}$  mm. This instrument has a decided advantage over the filar micrometer in that it is not necessary to move the cross hairs the entire length of the object. Complete with case..... 30.00



No. 8640.



No. 8648.



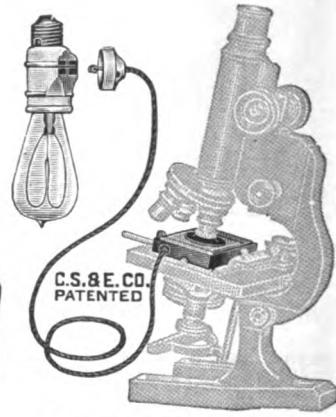
No. 8682.



No. 8656.



No. 8636.



No. 8656 (shown in use).

8636. **EYEPieces, Micrometer**, with fixed scale, providing a convenient method of using the micrometer scale. The eye lens is mounted in an adjustable sleeve permitting the scale to be brought into exact focus. Scale graduated to 5 mm in  $\frac{1}{100}$  mm divisions.

No.	A	B
Magnifying power, diameters.....	6	10
Each .....	\$6.50	6.50

8640. **ILLUMINATOR, Dark Field**, for use on any microscope. The condenser is mounted in a solid piece of brass with slots at the end for the stage clips of the microscope. It permits the use of slides on the top surface. The top surface of the condenser is provided with a little ring by which it may be carefully centered. Direct sunlight may be used. Fairly good results may be obtained by using a Welsbach light, but the best source of light is the electric arc light. No. 8682 Arc Light is especially constructed for such work. Complete in neat case, including special diaphragm for 1.8 mm oil immersion objectives..... 12.00

**ARC LAMP** for use with No. 8640, see No. 8682.

8648. **ILLUMINATOR, BULL'S-EYE CONDENSER**, for the illumination of opaque objects and for throwing parallel rays of light upon the mirror from an artificial source in ordinary work with transparent objects. Mounted as shown. Diameter of lens, 75mm..... 9.50

8650. **IMMERSION OIL, Cedarwood**, in 1-ounce vials..... per vial .36

8656. **INCUBATOR, Electric**, for use on microscope stages. Especially valuable in the Widal test, for the cultivation of bacteria, yeasts, spirochetes and tumor cells, and for the observation of malarial parasites. Dimensions,  $3\frac{1}{2} \times 2 \times \frac{1}{2}$  inch over all, with incubating chamber  $3 \times 1 \times \frac{1}{2}$  inch deep, having a removable glass bottom, consisting of a regular microscope slide. The top is a piece of clear mica with a hole cut through the center through which the lens is passed. A rubber washer is provided for sealing the opening. Complete with heater, thermometer, temperature regulator for any temperature from  $80^{\circ}$  to  $110^{\circ}$ F., cord and special plug for attachment to any regular 110-volt electric lamp socket, in velvet lined case..... 18.00

8682. **LAMP, Hand-Feed Arc**, the most powerful light source for microscopical work. It may be run on any house circuit, either A.C. or D.C., using the proper rheostat. The carbons may be moved independently or at the same time. A window is provided for observing the arc. The light rays are focused by means of a condenser in a sliding tube. A blue glass and a ground glass are provided, to fit in a groove in front of the condenser. The lamp is adjustable as to height and angle. Complete with blue and ground glass filters, cord and connecting plug but without rheostat or carbons..... 19.50

8683. **RHEOSTATS** for No. 8682, fixed form, 5 amperes.

No.	A	B
For volts.....	110	220
Each .....	7.00	10.00

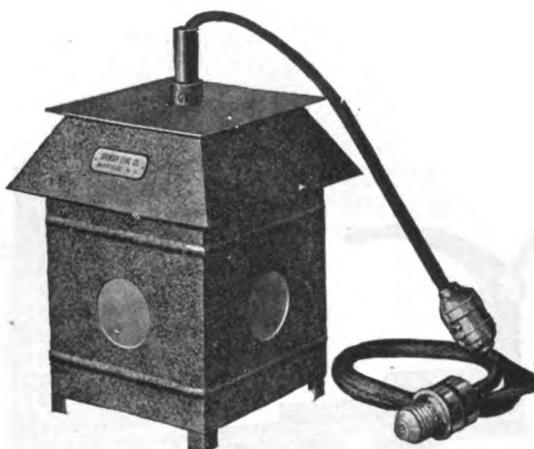
8684. **EXTRA CARBONS** for No. 8682..... each .06

8685. **DAYLITE GLASS AND ADAPTER**, for No. 8682..... per dozen .60

..... 2.00



No. 8688.



No. 8708.



No. 8722.

8688. **LAMP, Microscope, Miniature Electric**, small but very efficient, measuring 2x2x3½ inches, low enough to work beneath the substage condenser. It is usually used in this position, it then being necessary to swing the mirror of the microscope to one side. The back and base of the lamp are wood, making its use entirely safe for laying on a polished desk or other such surface. The frame is metal, finished with permanent crystal black which is very durable. The bulb is a 15-watt gas-filled, concentrated filament, and may be used directly on any 110-volt circuit, either direct or alternating. It may be used on 220-volt current with Rheostat No. 8691. A metal reflector behind the bulb concentrates the light and no light can escape except through the single opening. The intensity of illumination is ample for the use of 1.8 mm oil immersion objective and 10x ocular. Complete with five feet of cord and attachment plug with bulb, and blue and ground glasses ..... \$5.00

8689. **LAMP, Microscope**, same as No. 8688, but with Daylite glass..... 6.00

8690. **EXTRA BULBS** for Nos. 8688 and 8689..... each 1.25

8691. **RHEOSTAT** for use in series with Nos. 8688 and 8689 on 220-volt circuit..... 3.50

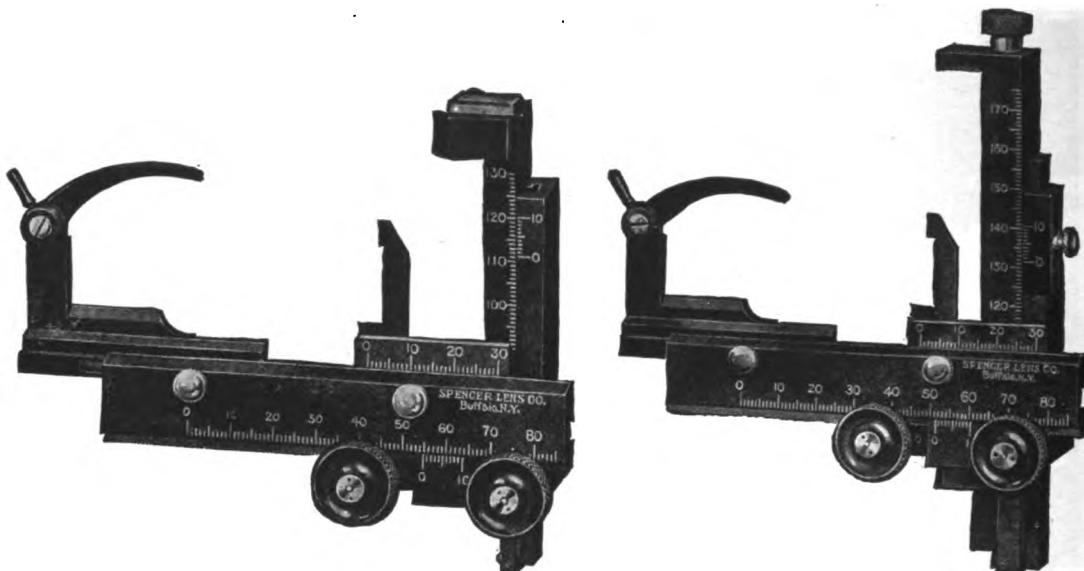
8708. **LAMP, Microscope, Spencer Quadruple**, for illuminating several microscopes at the same time. It measures 6x6x9 inches, and is entirely constructed of metal, finished with crystal black which is exceedingly durable. It is fitted with a 100-watt 110-volt Mazda gas-filled bulb, adjustable in height. A single lamp will supply illumination with entire satisfaction for four microscopes at a distance of three feet. The top of the lamp house reaches a maximum temperature of about 140°F., serving as a convenient place for drying specimen slides or keeping paraffine fluid. Complete with standard pear-shaped Mazda bulb, five feet of attachment cord, snap switch and plug, four ground and four blue glasses..... 11.00

8709. **LAMP, Microscope**, same as No. 8708, but fitted with four disks of Daylite glass..... 15.00

8710. **EXTRA BULB** for Nos. 8708-9, 100-watt, 110-volt ..... 1.50

8711. **RHEOSTAT** for use with Nos. 8708-9, on 220-volt circuit..... 6.75

8722. **DISTRIBUTING BOX** for **Microscope Lamps, Spencer Quadruple**, designed to meet the demand for using several microscope lamps on a single laboratory table from a single incandescent electric extension. Made of metal, fitted with five porcelain sockets. The current is supplied by attaching extension cord and plug to the top socket. It may quickly and easily be removed when the laboratory table is desired for other purposes..... 6.50



No. 8726.

No. 8727.

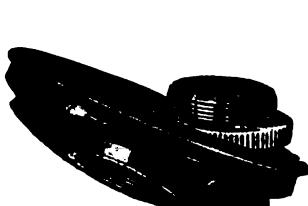
8726. **MECHANICAL STAGE.** Can be instantly and firmly attached by means of its clamps to any modern rectangular microscope stage and may be just as readily removed. A stop at the front always insures its return to the same position on the microscope stage, so that should work be interrupted and the mechanical stage removed, when it has been replaced, any part of the section under observation may be instantly found by noting the vernier readings. The movements of this mechanical stage are by diagonal rack and pinion and are entirely firm and reliable, permitting the most delicate adjustments. The range of movement is ample to cover the entire area of the standard  $75 \times 25$  mm slide. The slide rests upon the surface of the microscope stage and is held in place at one end by an adjustable stop with a spring clip and at the other by an adjustable stop, permitting the use of slides of varying lengths. Finished in alcohol-proof black enamel, complete in case..... \$23.00

8727. **MECHANICAL STAGE, Registering**, attachable to any microscope stage. This is a modification of No. 8726, so that the vernier readings designating the locations of objects taken on one microscope will register with the readings for the same objects taken on any other square staged microscope.  
Another important feature of this stage is the increased range of forward and lateral movements permitting the use of the entire area of slides including the  $75 \times 50$  mm size.  
The mechanism of this stage is exactly like that of No. 8726. The slide is held so far away from the working parts of the stage that its inner edge may be reached with any objective made. There are no projecting parts to hit the objective when revolved in the nosepiece. Finished in alcohol-proof black enamel, complete in case ..... 25.00

8730. **MICROMETER, Eyepiece**, a glass disk with finely ruled scale to be laid upon the diaphragm of an ordinary Huyghenian eyepiece, with a 5 mm scale divided into 50 parts (to 0.1 mm) 1.75

8731. **MICROMETER, Eyepiece**, same as No. 8730, but with scale divided into 100 parts (to 0.05 mm) ..... 2.50

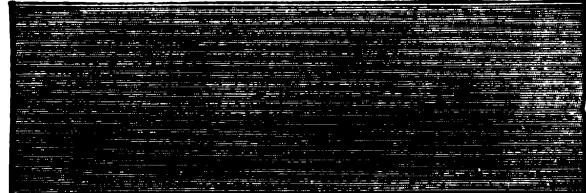
8734. **MICROMETER, Stage**, for standardizing eyepiece micrometers, consisting of a glass object slide with finely ruled scale, 1 mm divided into 100 parts ..... 4.25



No. 8738.



No. 8746.



No. 8760.

8738. **NOSEPIECES**, Revolving, of the circular type, dustproof. They are valuable accessories when the Microscope is supplied with more than one objective, as they save time and prevent damage and loss of objectives. When ordered with the microscope, objectives are so fitted that they are par-focal.

No.	A	B
Style	double	triple
Each	\$5.25	7.50

8746. **OBJECTIVES**, Achromatic, made in accordance with methods first adopted by Professor Abbe by which the complete mathematical formulation of the objective is first perfected, all of its elements clearly determined, such as the actual indices of refraction in the several optical glasses employed, the radii of the curved surfaces, the thicknesses of the lenses and the distances of separation, so that this work of prior calculation does away with all the uncertainties of experimental optics. A greater degree of perfection and a much greater uniformity are thus obtained than it is ever possible to obtain in microscope objectives made in other ways. In these calculations especial consideration is given to securing: flatness of field, critical definition, resolution and long working distance. All objectives are corrected for a tube length of 160 mm and a cover glass thickness of 0.18 mm. Nos. H and J are for oil immersion work.

No.	A	B	C	D	E	F	G	H	J
Equivalent focus, mm	48	32	25	16	8	4	4	1.8	1.5
Equivalent focus, about, inches.....	2	1 1/8	1	5/8	1/8	1/6	1/6	1/4	1/16
Numerical aperture ..	0.1	0.1	0.25	0.25	0.5	0.70	0.85	1.25	1.25
Working distance* with 160 mm tube and 10x eyepiece, mm .....	28	15	9.5	5	1.5	0.6	0.46	0.13	0.10
Diameter of the †real field, mm.....	6.5	4.7	3.3	2.1	1.	...	0.4	0.2	0.14
Each .....	5.50	5.50	7.00	7.00	11.00	11.00	11.00	35.00	55.00

\* Working distance is the distance between the front lens and cover glass.

† Real field is the diameter of the circular area seen through the microscope and measured in the plane of the object.

**Magnification Table.**  
Tube length, 160 mm.                          Image distance, 250 mm.

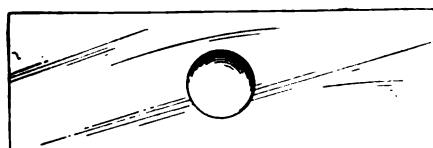
Objectives mm.	Initial Magnifica- tion	OCULARS								Objectives mm.
		4x	5x	6x	8x	10x	12x	15x	20x	
48	2.2	8	11	13	18	22	27	33	44	48
40	2.8	11	14	17	22	28	33	42	56	40
32	4	16	20	24	32	40	48	60	80	32
30-22	2-4.5	4-9	5-12	8-19	10-24	15-35	18-43	20-48	30-70	30-22
25.4	6	24	30	36	48	60	72	90	120	25.4
16	10	40	50	60	80	100	120	150	200	16
12	15	60	75	90	120	150	180	225	300	12
8	20	80	100	120	160	200	240	300	400	8
5	36	144	180	216	288	360	432	540	720	5
4	44	176	220	264	352	440	528	660	880	4
3	60	240	300	360	480	600	720	900	1200	3
1.8	95	380	475	570	760	950	1140	1425	1900	1.8
1.5	109	436	545	654	872	1090	1308	1635	2180	1.5

8760. **SLIDES**, Microscope, medium thick, 75x25 mm (3x1 inch), made of the best American half-white glass, with ground edges, in boxes of  $\frac{1}{2}$  gross.....per gross 1.50

8762. **SLIDES**, Microscope, same as No. 8760, but 75x50 mm (3x2 inches).....per gross 2.00

8764. **SLIDES**, Microscope, extra thin, 75x25 mm (3x1 inch), of white glass.....per gross 1.90

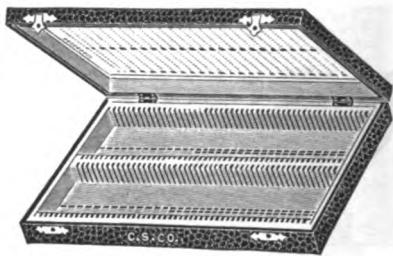
**SLIDES**, Microscope, prepared for use, see pages 173-178.



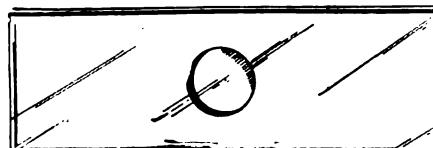
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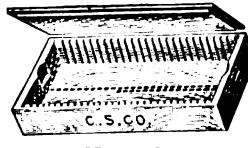
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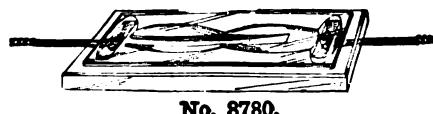
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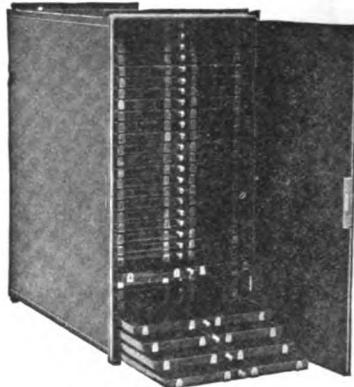
No. 8776.



No. 8798.



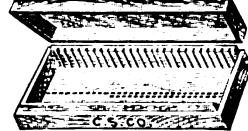
No. 8780.



No. 8810.



No. 8784.



No. 8788.

8768. **SLIDES, Microscope, concave center, 75x25 mm (3x1 inch).....per dozen \$0.90**

8776. **SLIDE, Drop Culture or Hanging Drop Slide, 75x25 mm (3x1 inch), with spherical cavity 22 mm in diameter by 3 mm deep, ground in polished plate glass..... .30**

8780. **SLIDE, Current, Holman's. A plate glass slip, with two oval cells connected by a very shallow channel. In use, the cells are partly filled with blood and covered by a thin cover glass. By bringing the finger near one of the cavities, the air is caused to expand and drive the blood through the channel where it may be observed under very favorable conditions. Complete with cover..... 2.00**

8784. **SLIDE, Life Box, consisting of two glass plates, one on a metal slip, the other adjusted to it by a sliding sleeve. For examining organisms in fluid. Diameter of cell, 25 mm; maximum depth, 8 mm; slip 32x80 mm..... 3.00**

8788. **SLIDE, Siphon, Holman's. Consists of a thick plate glass slip with two shallow oval cavities and a deep groove to hold a small fish or similar object and retain it without undue pressure in a fixed position. Small metallic tubes communicate with the extremity of the deep groove. By means of these tubes water may be siphoned through the slide thus keeping the water supply continuously renewed and enabling the object to be kept under observation for long periods of time. Complete with cover..... 6.00**

8792. **SLIDE MOUNTING CELLS, Glass. Rings with finely ground edges, for cementing on microscope slides to make cells. No. .... A B C D E**  

Diameter, mm.....	15	18	18	22	24
Height, mm.....	3	5	10	9	10
Each .....	.15	.15	.15	.18	.20

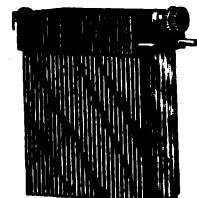
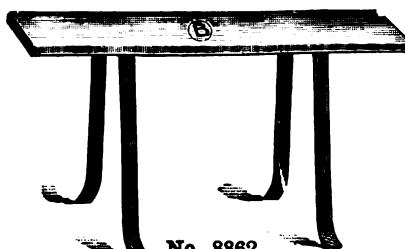
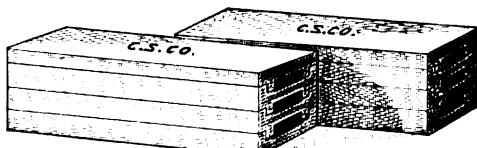
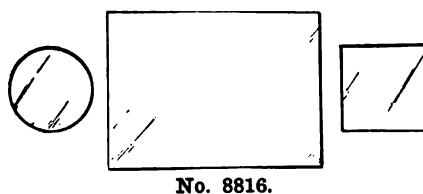
8798. **SLIDE BOXES, of white wood, with covers fitting inside, so arranged that when removed the ends of the slides are exposed so that they can be easily removed. Grooved to hold 25 objects, numbered and indexed.....per dozen .90**

8799. **SLIDE BOXES, same as No. 8798, but grooved to hold 12 slides numbered and indexed,.....per dozen .95**

8802. **SLIDE BOXES, of white wood with covers closely fitting outside, grooved to hold 25 objects, numbered and indexed.....per dozen 1.90**

8804. **SLIDE BOXES, grooved to hold 100 slides, with hinged cover and catch .....each .75**

8810. **SLIDE CABINET. Minot's Metal, very compact, occupying much less space than a wooden cabinet and affording much better protection against fire. It is strongly made of metal throughout, neatly finished on the outside in maroon colored japan with bronze stripes. The inside finish is in black japan. It contains 30 japanned metal trays, each holding 24 glass slides, 75x25 mm. The trays are provided with convenient knobs and with card-holders. The cabinet is furnished with a good brass lock and measures 36.3 cm in height, 32.5 cm in depth and 17.5 cm in width, outside. Complete with 30 trays..... 35.00**



8816. **SLIDE COVER GLASSES**, made of the best white glass, uniform in thickness, put up in boxes of  $\frac{1}{2}$  ounce each.

No.	Shape.	Thickness			Dimensions.		Price
		No.	mm.	inches	In ordering specify size desired, whether 15 mm. ( $\frac{5}{8}$ "), 18 mm ( $\frac{3}{4}$ "), 22 mm ( $\frac{7}{8}$ "), or 25 mm (1").		
A	Squares	1	0.13-0.17	$\frac{1}{200}-\frac{1}{150}$			\$1.20
B	Squares	2	0.17-0.25	$\frac{1}{150}-\frac{1}{100}$			1.05
C	Squares	3	0.25-0.50	$\frac{1}{100}-\frac{1}{50}$			1.00
D	Circles	1	0.13-0.17	$\frac{1}{200}-\frac{1}{150}$			1.50
E	Circles	2	0.17-0.25	$\frac{1}{150}-\frac{1}{100}$	22 mm ( $\frac{7}{8}$ "), or		1.35
F	Circles	3	0.25-0.50	$\frac{1}{100}-\frac{1}{50}$	25 mm (1").		1.30
G	Rectangular	2	0.17-0.25	$\frac{1}{150}-\frac{1}{100}$	22x40 mm (65=1 oz.)		1.50
H	Rectangular	2	0.17-0.25	$\frac{1}{150}-\frac{1}{100}$	22x50 mm (60=1 oz.)		1.50

Approximate Number of Covers Per Ounce.

	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"		$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"
Squares .....	296	206	150	116	Circles .....	362	280	182	142
No. 1 .....	234	162	120	92	No. 1 .....	286	195	157	112
No. 2 .....	196	136	100	76	No. 3 .....	240	166	122	93

SLIDE HOLDERS, see Dishes, Straining.

8818. **SLIDE HOLDER, Basket Form**, of nickelated brass, for use in staining a number of slides simultaneously. Capacity, 12 slides, placed back to back..... 1.50

8820. **SLIDE HOLDER, Multiplex**, designed by E. F. Miller of the University of California. Consists of a series of hard rubber plates sliding on rods, which can be clamped together by means of a knurled thumb screw. Will take any number of slides up to 26, and can be used in any kind of jar or receptacle..... 2.25

8176. **SLIDE LABELS** for glass slides, 22 mm square, in boxes of 100..... per box .10

8178. **SLIDE LABELS**, for glass slides, 22x15 mm, in boxes of 100..... per box .10

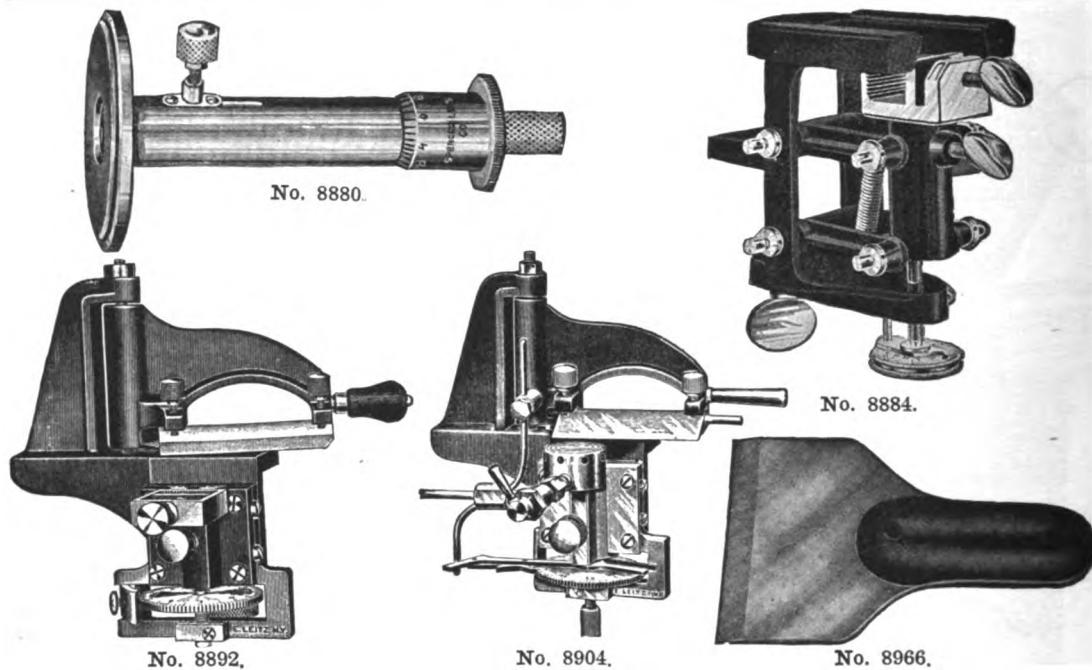
8832. **SLIDE MAILING CASES**, of wood, consisting of top, middle and bottom sections, for stacking.

No. ....	A	B	C
Section .....	top	middle	bottom
Per dozen .....	.10	.10	.10

8852. **STAGE, Warm, Electrically Heated**, for use with any microscope to keep the stage constantly at blood heat or other temperature. With this Warm Stage, micro-organisms may be observed under the microscope in the temperature of their natural habitat. Consists of a circular disk  $3\frac{1}{4}$  inches in diameter by  $\frac{1}{2}$  inch thick; with heating element, thermometer, and electro-thermostat, which can be adjusted to maintain any desired temperature on the top of the disk. The disk has a  $\frac{3}{4}$ -inch hole in the center, over which the regular microscope slide may be placed. Complete with cord and special plug for attachment to any 110-volt lamp socket .....

8858. **TURN TABLE** for ringing mounts. The slide is held on a revolving disk; the application of cement or varnish is accurately made by a brush held above; with self-centering device, detachable hand-rest and clips for holding down slides. Diameter of turn table, 88 mm.. 10.00

8862. **WARMING TABLE**, of copper plate, for drying and mounting. Length, 350 mm; width, 100 mm; height, 213 mm..... 1.75



## MICROTOMES AND ACCESSORIES

8880. **MICROTOME, Hand**, intended for rapid class work or where expense is the chief consideration. The object is placed in a clamp in the upper end of the tube, and is raised through the hole in the glass plate by an accurately cut screw, which is entirely enclosed and protected from dust and injury. The feed is accurate and finely graduated. Each division represents 10 microns. The plate at the top over which the knife is drawn is 3 inches in diameter, making a firm support for the knife.....without knife \$8.00

8884. **MICROTOME, Table**, for all kinds of sectioning, including the freezing method. The object clamp is placed in a vertically movable socket, held by hardened steel pivot screws in two vertically swinging arms which are similarly attached to the main frame. The movement thus provided for is regulated by a micrometer screw, with graduated disk and index plate. The finest feed is  $2\frac{1}{2}$  microns. The knife travels on glass plates set in grooves in the metal. These plates are extra long, so that the microtome knife will not be drawn off from the ends, thereby endangering its edge. When equipped with a freezing attachment, it makes a very satisfactory microtome for frozen section work. (See Nos. 8885 and 8886.) without knife 15.00

8885. **MICROTOME, Table**, same as No. 8884, but with No. 8940 Freezing Attachment for Carbon Dioxide ..... 25.00

8886. **MICROTOME, Table**, same as No. 8884, but with No. 8942 Freezing Attachment for Ether 22.50

8966. **MICROTOME KNIFE**, chisel blade form, with 88 mm cutting edge, for use especially on Nos. 8884 to 8886 ..... 4.00

8892. **MICROTOME, Clinical and Diagnostic, for Hand Feed**, provided with micrometer screw with graduated or toothed head, each division representing 5 microns of feed. The hinged arm carrying the knife is held rigidly in line by the solid metal frame preventing an uneven or inaccurate cut. Complete with object clamp to take paraffine blocks up to 30x22 mm, but without knife ..... 23.00

8894. **MICROTOME, Clinical and Diagnostic, for Hand Feed**, same as No. 8892, but with freezing chamber for carbon dioxide with needle valve to control the flow of gas. Will take objects up to 30 mm in diameter ..... without knife or object clamp 26.00

8896. **MICROTOME, Clinical and Diagnostic, for Hand Feed**, same as No. 8894, but with both paraffine clamp and freezing chamber for carbon dioxide ..... without knife 28.00

8897. **KNIFE FOR PARAFFINE SECTIONS**, for use with Nos. 8892 and 8896, with 80 mm cutting edge ..... 6.50

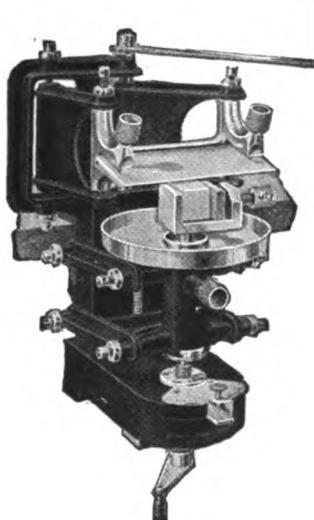
8898. **KNIFE for Frozen Sections**, for use with Nos. 8894 and 8896, with 80 mm cutting edge.. 6.00

8902. **MICROTOME, Clinical and Diagnostic, with Automatic Feed**, similar in construction to No. 8892, but with automatic device for moving the feed screw as the knife is returned for the next stroke. Complete with object clamp for paraffine blocks up to 30x22 mm, but without knife ..... 37.00

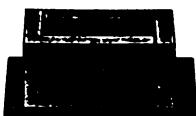
8904. **MICROTOME, Clinical and Diagnostic, with Automatic Feed**, same as No. 8902, but with freezing chamber for carbon dioxide.....without knife or object clamp 42.00

8906. **MICROTOME, Clinical and Diagnostic, with Automatic Feed**, same as No. 8902, but with both paraffine clamp and freezing chamber for carbon dioxide.....without knife 44.00

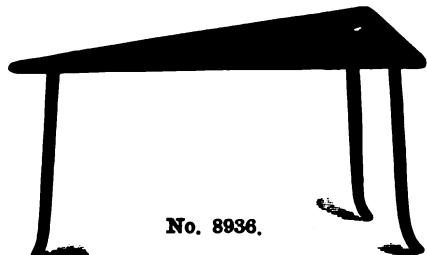
**KNIVES** for Nos. 8902, 8904 and 8906, see Nos. 8897 and 8898.



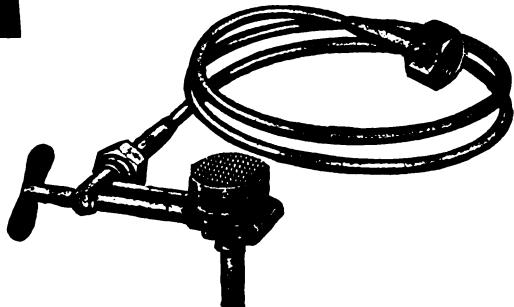
No. 8910.



No. 8934.



No. 8936.



No. 8940.

8910. **MICROTOME, Automatic Laboratory**, designed to do away with all sliding parts. The feed mechanism is automatic, simple in construction, covered and protected from dust and drippings. The microtome may be securely clamped to any laboratory table. It may be set to cut sections of any desired thickness. Each division of the graduated scale marks 5 microns. The extreme ends of the knife rest in the carrier, and, as the lever handle moves the swinging arms, the knife describes a flattened curve, corresponding to the double movement in free-hand sectioning. By this manner of holding the knife by arms which are not parallel, the entire length of its cutting edge is utilized, insuring uniform wear and permitting the cutting of very large sections. This peculiar motion of the knife makes this microtome pre-eminently fitted for cutting frozen sections. Complete with one knife and usual object clamp for paraffine or celloidin, in case..... \$75.00

8912. **MICROTOME, Automatic Laboratory**, same as No. 8910, but fitted with No. 8940 Freezing Attachment for Carbon Dioxide..... 85.00

8914. **MICROTOME, Automatic Laboratory**, same as No. 8910, but fitted with No. 8942 Freezing Attachment for Ether..... 82.50

### MICROTOME ACCESSORIES

8932. **BLOCKS, Red Fiber**, for holding specimens for sectioning.  

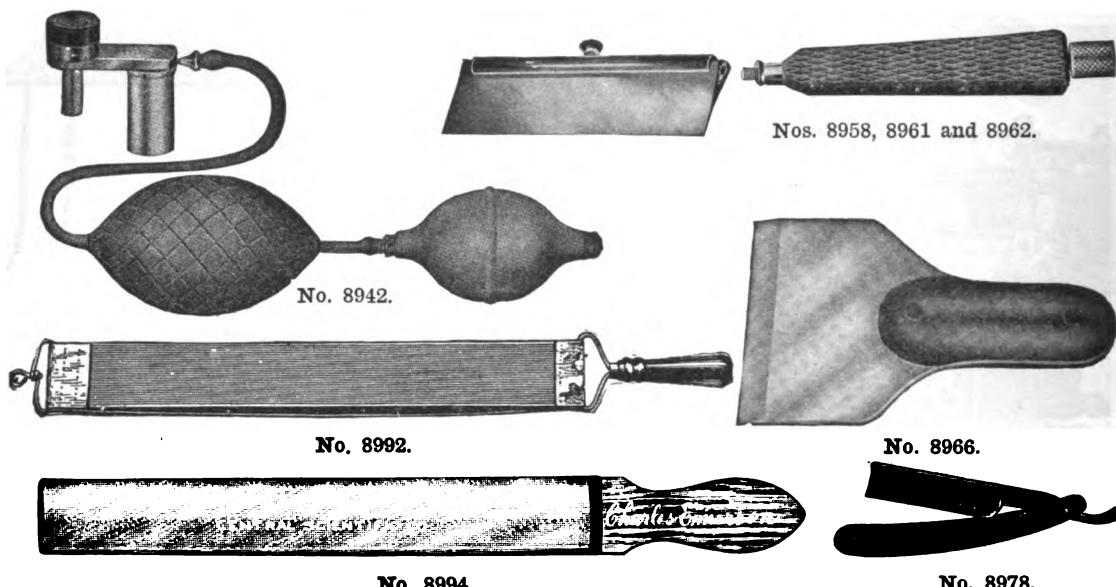
No. ....	A	B	C	D
Size, inches .....	$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{4}$	$\frac{5}{8} \times \frac{5}{8} \times \frac{1}{4}$	$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{4}$	$1 \times 1 \times \frac{1}{4}$
Per 100 .....	3.00	4.50	6.00	7.50

8934. **EMBEDDING BOX** for Paraffine, consisting of two angle pieces of metal with a metal plate.  

No. ....	A	B	C
Height, mm .....	10	20	30
Each .....	1.20	1.30	1.40

8936. **EMBEDDING TABLE** for Paraffine, of copper, 400 mm long and 190 mm wide tapering to a point. With removable legs, 213 mm high..... 2.00

8940. **FREEZING ATTACHMENT** for Carbon Dioxide, for Nos. 8884 and 8910 Microtomes. Substantially made, easy to operate, and exceedingly efficient. A hard rubber non-conducting ring between the corrugated plate, to which the object is frozen, and the rest of the apparatus, prevents the conduction of cold away from the specimen, thus saving time and gas. The chamber is provided with a pin like that on the object clamp, which fits into the same socket on the microtome. The chamber is connected with the CO<sub>2</sub> cylinder by a flexible copper tube. In operating, the valve at the chamber should first be closed and the valve at the cylinder slightly opened, to admit the gas into the tube. Then, by opening and closing the small valve at the chamber three or four times in quick succession, the tissue is frozen without any waste of gas and without any inconvenience caused by the freezing up of the chamber or the connections. By this method a section may be cut, stained and mounted ready for examination in one and one-half minutes from the time the tissue is put on the chamber. Complete with copper tube connections..... 10.00



8942. **FREEZING ATTACHMENT** for Ether. Consists of a freezing chamber of hard rubber which so prevents the radiation of the cold that the tissue is quickly frozen. It will freeze tissue 15 mm in diameter and 3 mm thick in one minute, using only 5 cc of ether. The ether is held in the metal tank, which for filling may be unscrewed from the support from which it is suspended. Any excess of ether which does not evaporate is drained back into the metal chamber from which it came. There are no bottles or entangling tubes and no waste of ether. It is simple, compact and efficient. It can be used on any sliding microtome, such as Nos. 8884 and 8910. .... \$7.50

8948. **HONE, Ezy Edge**, 5 $\frac{1}{4}$  inches long by 2 inches wide, a fast, smooth-cutting hone, combining the sharpness of an artificial hone with the softness of the Belgian. With directions for use .75

8950. **HONE, Blue-Green**, with small rubbing block, 6 inches long..... .20

8952. **PALM OIL SOAP** for use with Nos. 8948 and 8950. .... per cake .15

8958. **KNIVES, Microtome**, of selected steel, so ground and tempered as to produce an edge which is not brittle and at the same time is hard enough and tough enough to retain its keenness. Comparatively easy to sharpen; evenly tempered; broad and heavy. Without handle or back, in velvet case. No. ..... A B C D  
Cutting edge, mm. .... 50 110 185 . 250  
Each ..... 4.50 7.00 12.00 17.00

8961. **HANDLE, Ebonized**, for use in sharpening Nos. 8958 and 8960 Microtome Knives. The handle is provided with steady-pins to hold it in proper position, while the handle-rod is threaded to engage directly with the corresponding thread cut in the knife, and is tightened by means of a milled head. The metal parts are finely nickel-plated ..... 1.25

8962. **HONING BACK** for No. 8958B Microtome Knife, to be used in order that the knife may rest upon the honing stone at the proper angle when being sharpened. Polished and nickel-plated ..... 1.25

8966. **KNIFE, Microtome, Chisel Blade**, for use on the table microtome, especially where a freezing chamber is used. Cutting edge, 88 mm. The handle is of such size and shape that the knife may be easily held in the desired position..... 4.00

8972. **PITH**, for use in cutting sections; in sticks about 100 mm in length and 6 to 12 mm in diameter; in packages of about 50 grams..... per package .10

8978. **RAZOR, Section**, folding handle, best quality; one side of blade flat, the other side concave: straight edge, hard rubber handle; length of blade, 80 mm. In case..... 3.00

8986. **STROP, Microtome Knife**, consisting of a flat strip of wood with handle, on the sides of which are cemented pieces of leather 1 $\frac{1}{4}$  by 11 inches long. One side has been treated with carborundum powder, the other is left smooth for finishing..... 1.50

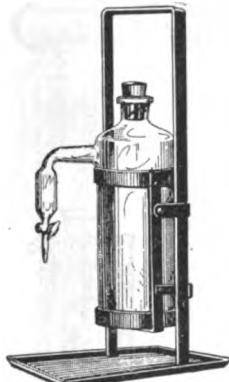
8987. **STROP, Microtome Knife**, similar to No. 8986, but with leather on one side only which has been treated with carborundum. Dimensions, 2 $\frac{1}{4}$ x15 inches..... 1.75

8988. **STROP, Microtome Knife**, same as No. 8987, but covered with best shell butt horsehide. 2.50

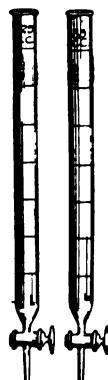
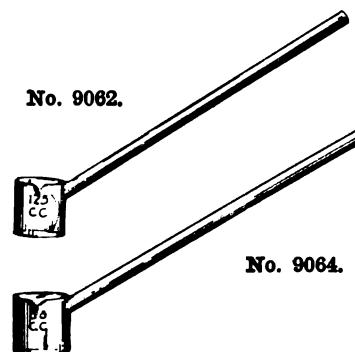
8992. **STROP, Razor**, 21x2 inches, of double Russian red leather, with India filled back, corrugated with nickel-plated swivel and handle..... 1.25

8994. **STROPS, Razor, Emerson's**, of calf-skin, specially selected for use with microtome knives and section razors. No. ..... A B  
Length, inches..... 13 $\frac{1}{2}$  17 $\frac{1}{4}$   
Each ..... 1.40 2.25

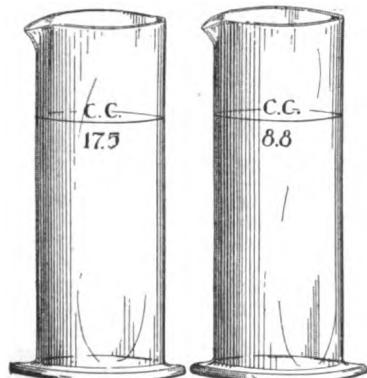
8996. **DRESSING** for strops..... per box .45



Nos. 9050 and 9052.

No. No.  
9056. 9058.

No. 9064.



No. 9066.

No. 9068.



No. 9072.



No. 9078.

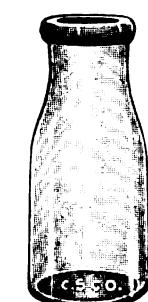
## MILK AND BUTTER TESTING APPARATUS

(Arranged Alphabetically.)

9050. ACID BOTTLE, Combined. By tipping the bottle forward and then letting it come back to upright position, the pipette will fill with 17.5 cc of acid.....	\$5.00
9052. ACID BOTTLE TRUNNION, convenient for handling No. 9050 Acid Bottle. Base is of wood covered with lead, which is not acted on by sulphuric acid. Bottle automatically returns to position after tipping.....	2.90
9056. ACID BURETTES. No.....	A      B      C      D
Number of charges of 17.5 cc.....	3      6      12      25
Each .....	2.25      2.25      2.50      3.50
9058. ACID BURETTES. No.....	A      B      C
Number of charges of 8.8 cc.....	6      12      25
Each .....	2.25      2.25      3.50
9062. ACID DIPPER, Nafis' Style, 17.5 cc.....	.40
9064. ACID DIPPER, Nafis' Style, 8.8 cc.....	.40
9066. ACID MEASURE, cylindrical jar with lip, 17.5 cc .....	.15
9068. ACID MEASURE, cylindrical jar with lip, 8.8 cc .....	.15
9072. ACID PIPETTE, Automatic, Farrington's, consisting of a two-neck Woulff bottle, one neck being fitted with a No. 10461 Automatic Pipette, delivering 17.5 cc; the other neck a No. 1382 Double Rubber Bulb.....	complete 6.50
ACID, Sulphuric for Milk Testing. Prices quoted upon application.	
9078. ACID TESTER, Nafis', automatic, easy to manipulate, and self-adjusting. The liquid instantly readjusts itself to zero, so that the only reading to be taken in using the apparatus is at the point on the graduated scale where the liquid surface is located after the sample is neutralized. Complete as illustrated, with neutralizer, 9 cc pipette, stirring rod, beaker, 2 ounce bottle of indicator and full directions.....	6.60



No. 9088.



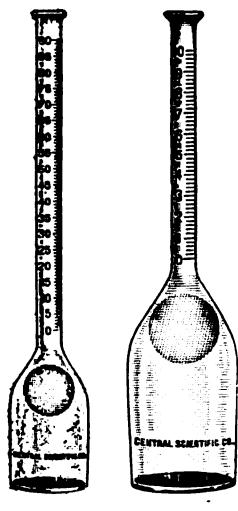
No. 9094.



No. 9080.



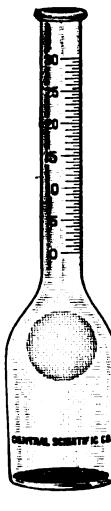
No. 9095.



No. 9092.



No. 9104.



No. 9108.



No. 9130.



No. 560.

9080. **STIRRING ROD**, Nafis' Faultless, for use in acidity tests. This rod is hollow and contains a piece of wool of the exact color which the sample of milk should have when the acidity test is complete ..... \$0.25

9084. **ACIDOMETER**, see general heading **Hydrometers**.

9084. **ALKALINE TABLETS**, Farrington's, for use in determining the degree of acidity of milk, cream, or whey ..... Per box of 50 tablets .50

APRONS, see general heading **Aprons**.

560. **BALANCE**, Cream, Wisconsin Hydrostatic, devised to meet the demand for a simple and correct method of weighing cream into test bottles. It consists of a specially devised brass float, which is placed in a cylinder of water. The instrument is weighted so as to float in a vertical position, and has at the top a small pan on which a cream bottle and a 9-gram weight are placed. By means of an adjustable pin point, the point to which the float sinks in water is readily marked. The 9-gram weight is then taken from the pan and the cream to be tested is weighed by dropping it slowly into the bottle with a pipette until the float sinks to the same point it reached with the weight on the pan, when the test bottle will contain exactly 9 grams of cream. Very accurate weighings can be made with this instrument and as there are no bearings to rust it will retain its sensitiveness indefinitely. Complete with metal cylinder, float, and 9-gram weight, but without bottle..... 7.50  
For other **BALANCES** for Milk and Cream Testing, see general heading **Balances**.

9088. **BOTTLES**, Aluminum Screw Cap, for holding samples of cream. With cork washer. One ounce capacity ..... Per dozen .85

9092. **BOTTLE**, Butter Test, Illinois pattern, a 9 inch bottle for testing 9 gram samples of butter. The neck is graduated for reading up to 90 per cent., and the results obtained compare very favorably with those obtained by chemical analysis..... .55

9094. **BOTTLES**, Milk Jars, for composite tests, made of flint glass; will stand much hard usage.  
Capacity, pints .....  $\frac{3}{4}$  1 2  
Per dozen ..... 1.25 1.50 1.60

9095. **CAPS**, Tin, for No. 9094 Milk Jars. Will fit either size, and keep out dirt and impurities. .... Per dozen .30

**BOTTLES, MILK AND CREAM TEST, USUAL TYPE**

9102. **BOTTLE**, Milk Test, 6 inch, 18 gram, 8 per cent. Graduated to  $\frac{1}{10}$  per cent..... .35

9104. **BOTTLE**, Milk Test, 6 inch, 18 gram, 10 per cent. Graduated to  $\frac{2}{10}$  per cent..... .35

9108. **BOTTLE**, Cream Test, 6 inch, 18 gram, 30 per cent. Graduated to  $\frac{1}{2}$  per cent..... .35

9110. **BOTTLE**, Cream Test, 6 inch, 18 gram, 40 per cent. Graduated to 1 per cent..... .35

9112. **BOTTLE**, Cream Test, 6 inch, 18 gram, 50 per cent. Graduated to 1 per cent..... .35

9114. **BOTTLE**, Cream Test, 6 inch, 9 gram, 50 per cent. Graduated to  $\frac{1}{2}$  per cent. Direct reading .45

9120. **BOTTLE**, Cream Test, 9 inch, 18 gram, 30 per cent. Graduated to  $\frac{2}{10}$  per cent..... .45

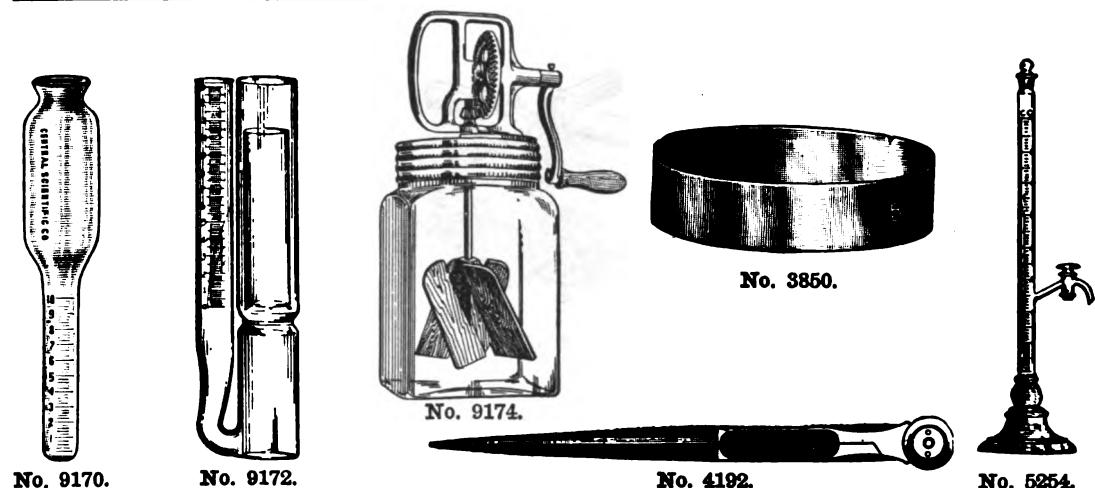
9122. **BOTTLE**, Cream Test, 9 inch, 18 gram, 50 per cent. Graduated to  $\frac{1}{2}$  per cent..... .45

9124. **BOTTLE**, Cream Test, 9 inch, 18 gram, 55 per cent. Graduated to  $\frac{1}{2}$  per cent..... .45

9126. **BOTTLE**, Cream Test, 9 inch, 18 gram, 100 per cent. Graduated to 1 per cent..... .60

NOTE: Nine inch Cream Test Bottles are too long for regular Babcock Testers. See No. 9206 Cream Tester.

9130. **BOTTLE**, Skim Milk, Perfect, 6 inch. Graduated to  $\frac{1}{100}$  per cent..... .95



### BOTTLES, MILK AND CREAM TEST, STANDARD

The following bottles (Nos. 9136 to 9142) are made in accordance with the specifications formulated by the Bureau of Standards, Washington, D. C., and adopted by the Official Dairy Instructors' Association, and by the State of Indiana.

9136.	<b>BOTTLE, Milk Test, Standard,</b> 6-inch, 18-gram, 8 per cent. Graduated to $\frac{1}{10}$ per cent..	<b>\$0.40</b>
9140.	<b>BOTTLE, Cream Test, Standard,</b> 6-inch, 9-gram, 50 per cent. Graduated to $\frac{1}{2}$ per cent..	.50
9142.	<b>BOTTLE, Cream Test, Standard,</b> 9-inch, 9-gram, 50 per cent. Graduated to $\frac{1}{2}$ per cent..	.50
The following bottles (Nos. 9146 to 9160) are made in accordance with the specifications formulated by the Dairy and Food Commission, Madison, Wis.		
9146.	<b>BOTTLE, Milk Test, Standard,</b> 6-inch, 18-gram, 10 per cent. Graduated to $\frac{1}{10}$ per cent..	.35
9150.	<b>BOTTLE, Cream Test, Standard,</b> 6-inch, 18-gram, 30 per cent. Graduated to $\frac{1}{2}$ per cent..	.40
9152.	<b>BOTTLE, Cream Test, Standard,</b> 6-inch, 18-gram, 40 per cent. Graduated to $\frac{1}{2}$ per cent..	.40
9154.	<b>BOTTLE, Cream Test, Standard,</b> 7 $\frac{1}{2}$ -inch, 18-gram, 50 per cent. Graduated to $\frac{1}{2}$ per cent..	.45
9156.	<b>BOTTLE, Cream Test, Standard,</b> 9-inch, 18-gram, 30 per cent. Graduated to $\frac{1}{10}$ per cent..	.45
9160.	<b>BOTTLE, Cream Test, Standard,</b> 9-inch, 18-gram, 50 per cent. Graduated to $\frac{1}{2}$ per cent..	.45
<b>BRUSHES</b> for cleaning Milk and Cream Test Bottles, see general heading Brushes.		
<b>BRUSH</b> for cleaning Milk Jars, see Brushes.		

3848.	<b>CAPSULES</b> , of lead (tin) foil for milk analysis. No. ....	A	B	C
	Size, inches.....	$2\frac{3}{4} \times \frac{1}{4}$	$2\frac{1}{4} \times 1\frac{1}{16}$	$3\frac{1}{2} \times \frac{1}{4}$
	Per 100 .....	3.50	3.50	3.50

For other **CAPSULES**, see general heading Capsules.

9170.	<b>CASEIN TUBE</b> , Hart's, for estimating amount of casein in milk. To be used in any Babcock Milk Tester .....	.50		
9172.	<b>CATALASE APPARATUS</b> , for determining the presence and relative amount of catalase in milk, with measuring arm graduated from 0 to 13 cc in $\frac{1}{10}$ cc divisions. Complete with tube for holding sample, one-hole rubber stopper and glass rod to close hole in stopper..	2.50		
9173.	<b>CHARTS, Milk Record</b> , for one week's record of 15 cows, with spaces for both morning and afternoon production, in pounds and tenths..... per hundred	1.00		
9174.	<b>CHURNS, Dazey</b> , for family and experimental use. Jars are of glass, so that process can be watched, and are made square to prevent racing of cream and to give double agitation. With aluminum-coated castings, heavily nickelized cap, hardwood turbine dasher, heavily tin-plated dash rod, smooth-running gears, with directions for use. No. ....	A B C		
	Total capacity, pints.....	4		
	Churning capacity, pints.....	2		
	Each .....	2.00		
		2.40		
		3.00		
3850.	<b>DISHES, Milk</b> , of aluminum, flat bottom, straight sides.	A B C D		
	No. ....			
	Diameter, inches.....	2	$2\frac{1}{2}$	3
	Height, inches.....	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
	Each .....	.25	.30	.40
				.45

For other **DISHES**, see general headings Capsules; Dishes, Evaporating; etc.

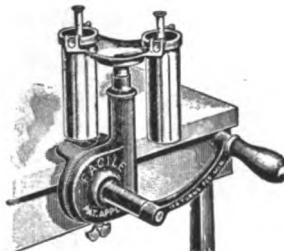
4192.	<b>DIVIDERS, Plain Brass</b> , for reading graduations on test bottles. Length 4 $\frac{1}{2}$ inches....	.60
5254.	<b>FAT EXTRACTION TUBE</b> , Roehrig, for the determination of fat in milk and milk products, by the Roesse-Gottlieb method, adopted as standard by the Association of Official Agricultural Chemists .....	5.00

**HYDROMETERS**, see general heading Hydrometers.

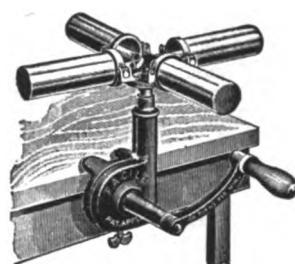
**HYDROMETER JARS**, see general heading Hydrometers.

**JARS, Sample**, see general heading Jars.

**LACTOMETERS**, see general heading Hydrometers.



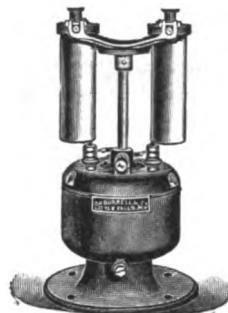
No. 9194.



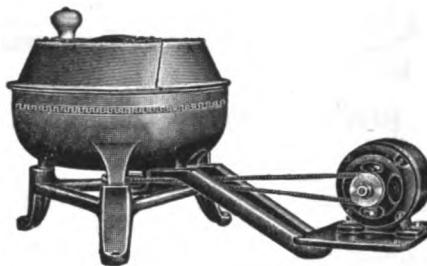
No. 9200.



No. 9204D.



Nos. 9210-11.



Nos. 9214-15.

**9194. MILK TESTER, Babcock, for hand power,** with enclosed cut steel spiral gears which run in grease without noise. A clamp is provided for attaching to any table. With seamless brass pockets firmly secured, of the proper depth to contain hot water to submerge the bottles. Complete with two 6 inch, 18 gram, 10 per cent. milk test bottles; one 17.6 cc pipette; one 17.5 cc acid measure; one test bottle brush, and full directions for use ..... \$6.50

**9196. MILK AND CREAM TESTER, Babcock, for hand power,** same as No. 9194, but with two 6 inch, 18 gram, 10 per cent. milk test bottles; two 6 inch, 18 gram, 30 per cent. cream test bottles; one combined 17.6-18 cc pipette; one 17.5 cc acid measure; one test bottle brush, and full directions for use ..... 7.15

**9200. MILK AND CREAM TESTER, Babcock, for hand power,** same as No. 9194, but four bottle size. Complete with four 6 inch, 18 gram, 10 per cent. milk test bottles; two 6 inch, 18 gram, 30 per cent. cream test bottles; one combined 17.6-18 cc pipette; one 17.5 cc acid measure; one test bottle brush, and full directions for use ..... 8.50

**9204. MILK TESTERS, Babcock, for hand power,** with solid iron case and hinged cover, cut steel spiral and spur gears and seamless brass pockets, with tinned malleable hangers. Gearing and shafts are mounted on a separate frame easily removed for repairs or repacking with grease. Complete with one set of 6 inch, 18 gram, 10 per cent. milk test bottles, one 17.6 cc pipette, one 17.5 cc acid measure, one test bottle brush and full directions.

No. ....	A	B	C	D
Capacity, bottles .....	6	8	10	12
Each .....	16.65	17.60	18.70	20.10

**9206. CREAM TESTER, Babcock, for hand power,** twelve bottle size, same as No. 9204 Milk Tester, but for 9 inch cream bottles. Complete with twelve 9 inch, 18 gram, 30 per cent. cream test bottles, one 18 cc pipette, one 17.5 cc acid measure, one test bottle brush, and full directions.... 44.00

**MILK TESTERS, Babcock, Electric,** same style as No. 9194, but mounted directly on a vertical spindle electric motor. Prices include glassware and accessories listed under Nos. 9194 and 9196.

No. ....	A	B
Capacity, bottles.....	2	4

**9210. For 110 volts, A.C.**..... 54.00 55.00

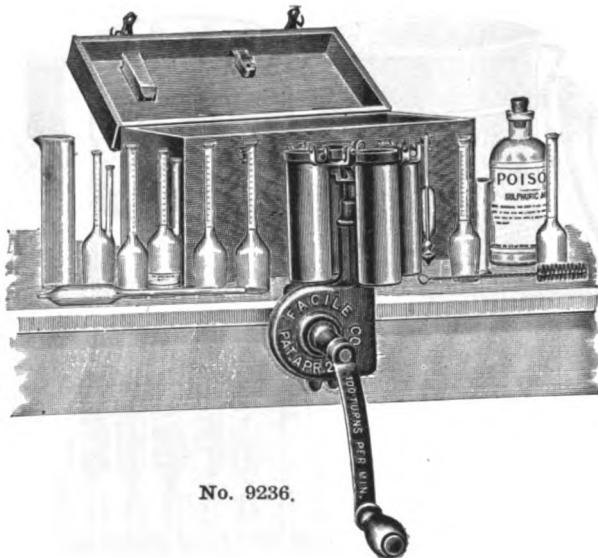
**9211. For 110 volts, D.C.**..... 54.00 55.00

**MILK TESTERS, Babcock, Electric,** with same frame and bottle carrier as No. 9204. The motor which is a standard  $\frac{1}{12}$  h. p. G. E. motor with a speed of 1800 r. p. m., is carried on a separate frame or sub-base and is belt driven requiring no starting device. Prices include glassware and accessories listed under No. 9204.

No. ....	A	B	C
Capacity, bottles.....	6	8	10

**9214. For 110 volts, A.C.**..... 58.00 59.00 60.00

**9215. For 110 volts, D.C.**..... 58.00 59.00 60.00



9236. **MILK TESTER, Babcock, Traveling Outfit**, consisting of two-bottle Babcock Tester No. 9194, and the following accessories:  
 2 6-inch, 18-gram, 10% milk test bottles. 1 floating dairy thermometer.  
 2 6-inch, 18-gram, 30% cream test bottles. 1 hydrometer jar,  $10 \times 1\frac{1}{2}$  inches.  
 2 double neck skim milk bottles. 1 17.5 cc acid measure.  
 1 cream and milk pipette (17.6-18 cc.) 1 small Quevenne's lactometer.  
 1 test bottle brush. 1 set directions.  
 Complete in handsomely finished hardwood case with separate compartments for glassware and acid ..... \$15.40

9238. **MILK TESTER, Babcock, Traveling Outfit**, same as No. 9236, but with four-bottle Babcock Tester No. 9200, and two extra milk test bottles ..... 16.50

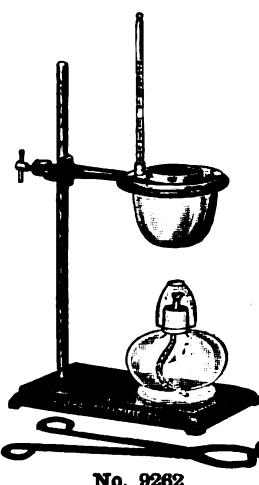
9240. **MILK TESTER, Babcock, Traveling Outfit**, consisting of No. 9200 Babcock Tester in a handsome leather case as shown in the illustration,  $10\frac{1}{4} \times 10\frac{1}{2} \times 10\frac{1}{2}$  inches outside. Complete with the same equipment of glassware and accessories as listed under No. 9238..... 33.00

### Repairs for Babcock Milk Testers

Nos. 9194 to 9200 and 9236 to 9240.

The numbers in parentheses are the manufacturer's numbers, which in some instances appear on the parts.

9241. <b>COVER</b> , with thumb screw and collar. This is the part of the gear case which attaches to the table. (452-1) .....	.85
9242. <b>CASE</b> . This is the front of the gear case on which the name "Facile" appears. (451-1). .....	.66
9243. <b>THUMB SCREW</b> . (454H).....	.17
9244. <b>SWIVEL</b> or collar for thumb screw. (454G).....	.06
9245. <b>SCREWS</b> for cover. (454I).....	.03
9246. <b>CRANK</b> only, without handle. (453).....	.33
9247. <b>CRANK</b> , complete with handle. (454E).....	.39
9248. <b>WOOD HANDLE</b> for crank. (454D).....	.06
9249. <b>HANDLE RIVET</b> . (454C).....	.06
9250. <b>CRANK SHAFT</b> . (454B).....	.12
9251. <b>TAPER PIN</b> for attaching crank to crank shaft. (454F).....	.03
9252. <b>GEAR</b> for inner end of crank shaft. (454).....	.85
9253. <b>WORM SPINDLE</b> , with slot at top for head. (454A) .....	.55
9254. <b>BALL</b> for bearing. (454J).....	.06
9255. <b>TWO-BOTTLE HEAD</b> , with rivets and pins, but without cups or cup holders. (455).....	.55
9256. <b>FOUR-BOTTLE HEAD</b> , with rivets and pins, but without cups or cup holders. (456)....	.85
9257. <b>CUP HOLDER AND BRASS CUP</b> . (457-457A) .....	.35



No. 9262.



No. 9270.



No. 9280.



No. 9282.



No. 9288.

9262. **MOISTURE TESTER**, Ames, for moisture in butter, consisting of a jacketed paraffine container made of copper. The outside shell has a rounded bottom to expose as much surface as possible to the heat from an alcohol lamp. An aluminum sample cup fits closely within the inside shell, having contact all the way down so that the heat from the paraffine is transmitted without loss. Complete with support stand, special thermometer reading from 100 to 200°C., alcohol lamp, tongs for lifting the sample out, and full directions. .... \$9.00

9266. **PAPER, Fat Free**, for the determination of fat in milk, according to Adams' method. In boxes of 50 strips, 560x65 mm. .... Per box 2.10

9270. **PASTEURIZING OUTFIT**, for steam or hot water, consisting of a neatly finished vessel with convenient handles and cover, and with rack for holding eight sterilizing bottles. Beads around the sterilizing chamber mark the points to which water should be filled. Complete with bottles and brush for cleaning. .... 4.50

9276. **PIPETTES, Cream**.

No. ....	A	B
Capacity, cc. ....	9	18
Each ....	.25	.25
Per dozen ....	2.50	2.50

9278. **PIPETTES, Milk**.

No. ....	A	B
Capacity, cc. ....	8.8	17.6
Each ....	.25	.25
Per dozen ....	2.50	2.50

9280. **PIPETTES, Milk**, 17.6 cc, in accordance with the specifications formulated by the Bureau of Standards and adopted by the Official Dairy Instructors' Association and by the State of Indiana. .... Each .35  
Per dozen 3.50

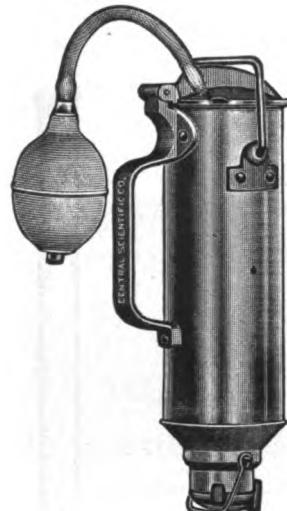
9282. **PIPETTES, Milk**, 17.6 cc, in accordance with the specifications formulated by the Dairy and Food Commission of Wisconsin. .... Each .30  
Per dozen 3.00

9284. **PIPETTES, Milk and Cream**, 17.6-18 cc combined. .... Each .19  
**PIPETTES, Volumetric**, see general heading **Pipettes**.

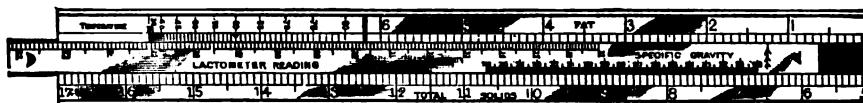
9288. **RACK**, for Babcock Test Bottles, of tin. Hangs flat against the wall; the bottles stand upright and are easily filled. Capacity, 24 bottles. .... 2.00



No. 9298.



No. 9308.



No. 9314.

9298. **SALT TESTER FOR BUTTER**, Nafis. This apparatus is automatic, easy to manipulate, and self-adjusting, and is especially suited for rapid determination of the per cent. of salts in butter. The liquid in the graduated tube instantly readjusts itself to zero so that the only reading to be taken in using the apparatus is at the point on the graduated scale where the liquid surface is located after the test is completed. With a 10-gram sample of butter each cc of solution drawn from the burette will equal  $\frac{1}{2}$  per cent. salt in the butter. Complete as illustrated together with 10-gram weight, 250 cc flask, standard solution in dry form, 25 cc pipette, porcelain cup, stirring rod, medicine dropper, beaker, 2-ounce bottle of indicator, and full directions..... \$7.50

9299. **STIRRING ROD**, Nafis' Faultless, for use in No. 9298 Salt Tester. This rod is colored to show the exact tint taken by the sample when the test is complete..... .25

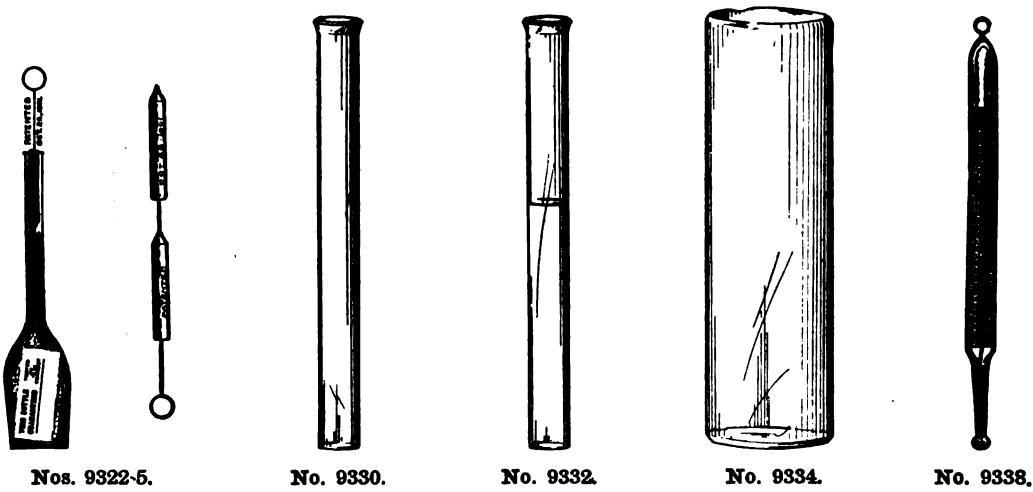
A1800B. **SCORE CARDS**, Dairy Cattle, in tablet of 50 sheets ..... Per tablet .25

A1824. **SCORE CARDS**, Market Cream, in tablet of 50 sheets..... Per tablet .25

9308. **SEDIMENT TESTER** for Milk, as described by Professors Babcock and Farrington. Consists of a cylinder  $2\frac{1}{2}$  inches in diameter and 6 inches long, funnel shaped at the bottom and terminating in an opening about 1 inch in diameter. In the cap at the bottom is a wire gauze strainer on which a thin disk of absorbent cotton is placed. After a pint sample of milk has been filtered through the apparatus, the cotton filter, with the dirt which it has collected, is detached and allowed to dry. The amount of dirt obtained will differ with different lots of milk and disks when dry may be returned to the milk producer as evidence as to the cleanliness of the milk. Complete with 500 disks ..... 12.00

9309. **DISKS**, Absorbent Cotton, for use with No. 9308 Sediment Tester, in boxes of 100, per box .50

9314. **SLIDE SCALE**, Richmond's, for calculating the total solids in milk, with scale for temperature correction of specific gravity. This slide rule will be found of great advantage and service to cheese factory men and milk inspectors, as well as those interested in the preparation and examination of milk for use of children and invalids..... 5.50



9316. TABLETS, Corrosive Sublimate, for keeping milk samples sweet. Used in making composite tests. Will color samples so that danger of mistakes is avoided. Small size will keep samples sweet for two weeks. In boxes of 50 tablets.....Per box \$0.30

9317. TABLETS, Corrosive Sublimate, same as No. 9316, but large size, will keep samples sweet for four weeks. In boxes of 50 tablets.....Per box .50

9322. TESTER, Nafis, for Babcock Test Bottles, made of brass. To make a test, fill the bottle with alcohol deeply colored with black aniline or writing ink until it is almost opaque (this does away with the meniscus) so that the highest point is exactly even with the zero mark. Then slowly lower the Tester into the bottle until the liquid rises half way between the two sections. At that point should be the middle mark. After that point is tested for, slowly lower the entire tester into the bottle so that the liquid rises over the top of the upper section about an eighth of an inch. If the liquid is even with the top mark and was also at the middle mark, the bottle is correct. For 6 inch, 10% milk test bottles..... .85

9323. TESTERS, Nafis, same as No. 9322, but for 6-inch, 18-gram cream test bottles.

No. ....	A	B	C
For bottles, per cent.....	30	40	50
Each .....	1.10	1.50	1.50

9324. TESTER, Nafis, same as No. 9322, but for 6-inch, 9-gram, 50% cream test bottles..... 1.50

9325. TESTERS, Nafis, same as No. 9322, but for 9-inch cream test bottles.

No. ....	A	B	C
For bottles, per cent.....	30	50	55
Each .....	1.50	1.50	1.50

9330. TEST TUBES, Butter Fat Oil, plain, 9x $\frac{3}{4}$  inches .....Per dozen 1.00

9332. TEST TUBES, Butter Fat Oil, with line 5 inches from bottom.....Per dozen 1.00

9334. TEST TUBES, Cream, heavy, for samples, 5x1 $\frac{1}{4}$  inches .....Per dozen 1.00

9338. THERMOMETER, Dairy, standard, for those who wish a more accurate thermometer than the ordinary. Hand-written paper scale, one degree graduation, accurate within one division of the scale, weighted with shot and guaranteed to float upright. Ten inches long. Approximate scale range 10° to 110° Fahrenheit..... 2.40

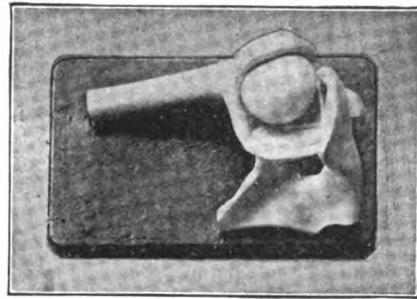
9340. THERMOMETER, Pasteurizing, with enclosed hand-written paper scale; approximate scale range 30° to 220° Fahrenheit; graduated in 2° divisions and accurate within one division of the scale. .... 2.40

**MODELS, ANATOMICAL****MOUNTED AND IN NATURAL COLORS.**

A Key is Furnished with Each Model.

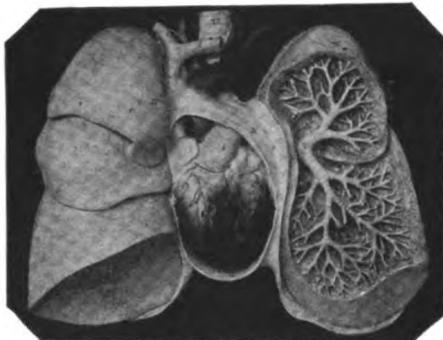


No. A1010.

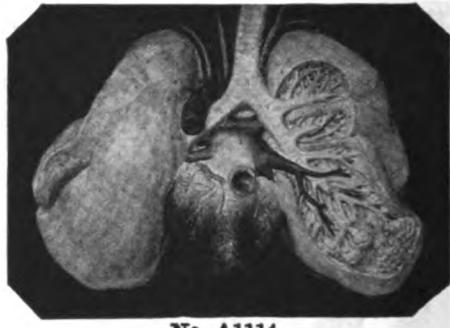


No. A1076.

A1000. <b>Brain</b> , natural size. View of upper portion, on plaque. Dimensions, 4 x 9½ inches. Shipping weight, 7¾ lbs.....	\$4.80
A1002. <b>Brain</b> , natural size. View of lower portion (basis of cerebral nerves), on plaque. Dimensions, 3¾ x 9½ inches. Shipping weight, 5 lbs.....	4.80
A1004. <b>Brain</b> , natural size. View of perpendicular section along the median line, on plaque. Dimensions, 3¾ x 9½ inches. Shipping weight, 5 lbs.....	4.80
A1006. <b>Brain</b> , natural size. View of transverse section of the head, showing the cavities, on plaque. Dimensions, 3½ x 9½ inches. Shipping weight, 7 lbs.....	4.80
A1010. <b>Skull and Brain</b> , natural size. The various parts of the brain can be taken out. Dimensions, 6½ x 10 x 8½ inches. Shipping weight, 9 lbs.....	13.50
A1011. <b>Brain</b> , only, natural size, of No. A1010.....	6.75
A1020. <b>Ear</b> , enlarged size. Separates into parts, showing the membrana tympani, the ossicles of the tympanum, the labyrinth and the half opened cochlea. Dimensions, 7 x 4 x 9½ inches. Shipping weight, 6¾ lbs.....	7.80
A1028. <b>Eye</b> , enlarged size. The upper portion, containing a microscopical representation of the layers of the retina, can be removed, when the cornea and the iris, the lens and the vitreous body may be taken out. Dimensions, 7 x 7½ x 7 inches. Shipping weight, 6¾ lbs.....	9.90
A1036. <b>Head</b> , natural size, with muscles, nerves and blood vessels of one side. Dimensions, 5 x 10 x 13½ inches. Shipping weight, 9½ lbs.....	7.10
A1038. <b>Head</b> , natural size. Cavities of skull and eye, upper and lower jaw. Dimensions, 5 x 10 x 13½ inches. Shipping weight, 8½ lbs.....	7.10
A1040. <b>Head</b> , natural size. Perpendicular section showing the brain, cavities of the mouth and nose, and the larynx and pharynx divided along the median line. Dimensions, 2½ x 9½ x 12 inches. Shipping weight, 8½ lbs.....	7.10
A1052. <b>Heart</b> , enlarged size. The anterior wall may be removed, exposing the four cavities of the heart and their openings and valves. Dimensions, 14½ x 8¼ x 6 inches. Shipping weight, 13½ lbs.....	13.00
A1060. <b>Joints, Ankle and Foot</b> , natural size, showing bones and ligaments. Dimensions, 5¾ x 4 x 10 inches. Shipping weight, 3½ lbs.....	5.60
A1062. <b>Joint, Elbow</b> , natural size, anterior view, showing bones and ligaments. Dimensions, 3 x 3½ x 6 inches. Shipping weight, 1½ lbs.....	2.75
A1064. <b>Joint, Elbow</b> , natural size, lateral view, showing bones and ligaments. Dimensions, 3 x 4½ x 6 inches. Shipping weight, 1½ lbs.....	2.75
A1068. <b>Joint, Hip</b> , natural size, showing bones and ligaments. Dimensions, 4 x 5 x 9½ inches. Shipping weight, 4 lbs.....	4.10
A1072. <b>Joint, Knee</b> , natural size, showing bones and ligaments. Dimensions, 6½ x 5½ x 9½ inches. Shipping weight, 4 lbs.....	4.10
A1076. <b>Joint, Shoulder</b> , natural size, showing bones and ligaments. Dimensions, 4½ x 5 x 7½ inches. Shipping weight, 3 lbs.....	3.75
A1080. <b>Joint, Wrist and Hand</b> , natural size, showing bones and ligaments. Dimensions, 2 x 5 x 9½ inches. Shipping weight, 3½ lbs.....	4.00



No. A1112.



No. A1114.



No. A1120.

A1092. **Larynx**, natural size. Anterior aspect, showing base of tongue, hyoid bone, thyroid gland, etc. Dimensions,  $2\frac{3}{4} \times 3\frac{1}{2} \times 5\frac{1}{4}$  inches. Shipping weight,  $1\frac{1}{4}$  lbs. .... \$3.40

A1094. **Larynx**, natural size. Posterior aspect, showing the glottis and vocal cords. Dimensions,  $2\frac{1}{2} \times 3\frac{3}{4} \times 6\frac{1}{2}$  inches. Shipping weight,  $1\frac{1}{2}$  lbs. .... 3.30

A1096. **Larynx**, natural size, in connection with the tongue and pharynx, the latter opened from behind. The parts are shown with mucous membrane covering. Dimensions,  $3\frac{3}{4} \times 4\frac{3}{4} \times 8\frac{1}{4}$  inches. Shipping weight,  $3\frac{1}{2}$  lbs. .... 3.40

A1100. **Larynx Phantom**, natural size, mask of the face with mouth open, dissectible from posterior view, showing details. Dimensions,  $13\frac{1}{2} \times 8\frac{1}{2} \times 7$  inches. Shipping weight,  $11\frac{1}{2}$  lbs. .... 10.75

A1112. **Lungs**, natural size. Anterior view of the lungs and heart. The pericardium opens and the anterior portion of the left lung may be removed, showing the bronchial ramifications, alveoli, etc. Dimensions,  $3 \times 11\frac{1}{2} \times 8\frac{1}{2}$  inches. Shipping weight, 6 lbs. .... 4.75

A1114. **Lungs**, natural size. Posterior view of the lungs and heart, with a representation of the bronchial ramifications, air cells, blood vessels and lobuli. Dimensions,  $2\frac{1}{2} \times 11\frac{1}{2} \times 8\frac{1}{4}$  inches. Shipping weight, 6 lbs. .... 4.75

A1120. **Organs of Respiration, Air Passages, Lungs and Heart**, natural size. The anterior part of both lungs and heart removes, laying open the lungs and showing the ramifications of the windpipe and the connection of the pulmonary blood vessels with the heart. Dimensions,  $5\frac{1}{2} \times 12 \times 14\frac{1}{2}$  inches. Shipping weight,  $16\frac{1}{2}$  lbs. .... 18.50

A1132. **Skin**, enlarged size. Transverse section, showing the organs of perspiration, a hair and its follicles, the pulp, sebaceous glands and tactile corpuscles. Dimensions,  $11\frac{1}{2} \times 12 \times 14$  inches. Shipping weight, 9 lbs. .... 5.50

A1140. **Teeth**, enlarged size. The anterior portion of the left maxillary bone is removed to show the development and structure of the teeth. Dimensions,  $3 \times 13 \times 7\frac{1}{4}$  inches. Shipping weight, 8 lbs. .... 6.00

A1148. **Trunk (Torso)**, natural size, with viscera of the chest and abdomen removable. Dimensions,  $26 \times 12 \times 10$  inches. Shipping weight, 72 lbs. .... 31.00

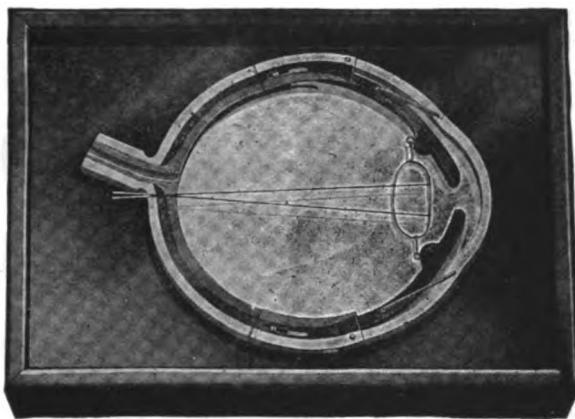


Fig. 1.

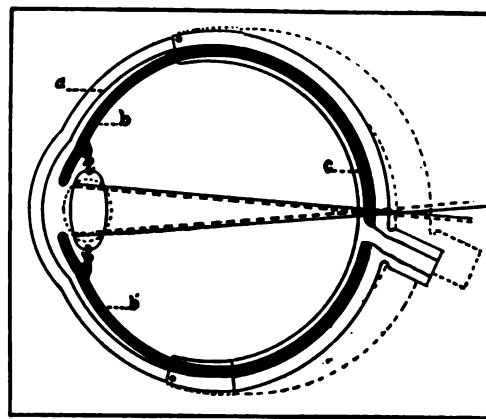


Fig. 2.

## No. F7315. MYERS' MECHANICAL MODEL OF THE EYE

Patented Oct. 29, 1912.

This model of the eye, the invention of Jesse J. Myers, Assistant Professor of Physiology, Michigan Agricultural College, demonstrates the mechanics of normal accommodation, and also shows the cause and effect of far and near sight. All this is accomplished in so simple a manner that the model can be used successfully in the grades of the public schools as well as in colleges. It is also useful to oculists and opticians when they wish to explain to their patients their condition and the correction proposed.

The model illustrated in Fig. 1 is enclosed in a finely finished case,  $19\frac{1}{2} \times 15\frac{1}{2} \times 3$  inches, provided with a glass front. Beneath this glass is a heavy bottom, which serves as a base to which are attached the parts of the model. As shown in Fig. 2, the eye is represented in longitudinal section by four pieces, a, b, b<sub>1</sub>, c.

The piece a, which represents the anterior part of the sclerotic coat, is fastened to the base; the other three parts are movable. The pieces, b, b<sub>1</sub>, which represent the anterior portion of the choroid coat, are so arranged mechanically that they are capable of motion in a curved line, so that they can be brought forward and together, also backward and apart. An elastic hoop, representing the crystalline lens, is suspended between these two pieces. When these pieces approach each other, the tension of the hoop is lessened and it assumes a more rounded form. Two coil springs, d and d<sub>1</sub>, representing the ciliary muscles contracting, aid in this movement to round out the lens. The effects of relaxing these muscles is shown by moving the pieces b and b<sub>1</sub> apart, thus increasing the tension and making the hoop less rounded. Thus simple accommodation is demonstrated.

The piece c represents the posterior part of the eye ball. Its three layers are represented each by a different color. This piece is capable of a backward and forward motion, thus elongating the eye ball to represent the condition of near sight and shortening it to represent the condition of far sight.

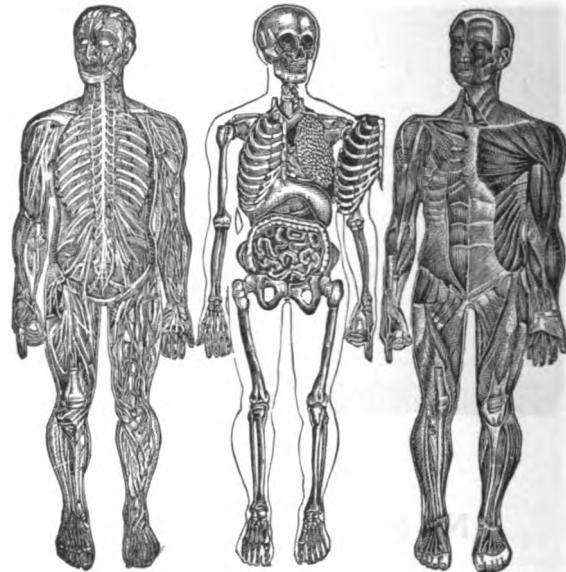
Two wires attached to the front side of the elastic hoop pass back across the hoop, converging and crossing each other near the back of the eye ball. These represent two rays of light, and where they intersect, the focal point. As the hoop becomes more rounded the intersection approaches the hoop. The reverse is true when the hoop becomes less rounded.

Thus there is represented in a visual way both normal and abnormal optics of the eye.

All movements of the model are controlled at the back by two knobs. One knob controls the shape of the elastic hoop, and by means of the other knob the piece c can be moved backward and forward, thus changing the length of the eye ball..... \$15.00



No. A1208.



No. A1220.

**A1208. MODEL, Natural Eye**, a real, natural eye, scientifically prepared and mounted. These eyes are first hardened and fixed, then sectioned in half and mounted in a glass cup in such a manner as to show clearly a half-section, horizontal view of the interior of the eye. Every part of the anatomy of the eye is held in its natural position by the careful method of preparation.

By its use the student can actually see not only the different coats of the eye ball, but the inner structures as well. From it one can pick out such minute structures as the blood vessels of the retina, capsule of the lens, suspensory ligament of the lens, etc. The normal relationship of the parts is preserved, enabling one to actually visualize the working parts of the eye, and in this way not only get, but retain a knowledge of this subject which it would be impossible to obtain from a cut alone.

These eyes are all mounted by an expert pathologist, and the time and skill required are very great, but the result is a real work of art. They are absolutely permanent, and we guarantee them to remain unchanged as long as the glass cell is not broken, or removed from the box. We also guarantee each one to be perfect and free from imperfections of any kind, and will cheerfully exchange any which fail to give entire satisfaction.

A diagram, carefully keyed to match the model, accompanies each one, making it easy to identify each part..... \$10.00

**MANIKIN, PILZ**, 5 feet 5 inches high, a life size figure of the human body, lithographed in natural colors on indestructible heavy linen cardboard. There are thirty large folds—455 parts shown. No part is detached, so that there is no trouble putting on and taking off, and there are no small parts to lose. It shows the blood vessels, nerves, muscles, internal organs and the skeleton in their proper position and relative dimensions, as follows:

Part I. The muscles of the anterior surface of the body. On the right side the superficial muscles are partially removed in order to bring the deeper layers into view. This section shows and designates 85 different muscles.

Part II. The muscles of the posterior surface of the body. On this plate also some of the superficial muscles are partially removed, so that the deeper layers may be recognized. At the occiput a portion of the cranium is removed, showing the brain in the cavity of the skull. There are 71 muscles shown in this section.

Part III. The circulation of the blood. The course of the arterial blood is marked in red, that of the venous blood in blue. This plate shows 61 different veins.

Part IV. The nervous system. The posterior portion of the cranium is shown removed longitudinally so as to bring into view the skull contents. This plate shows 76 nerves.

Part V. The skeleton. In this plate 101 parts of the skeleton and 60 parts of the viscera are shown in actual size and colors.

A1220. **MANIKIN, Pilz Life Size, Sexless**..... 15.00



No. 9388.



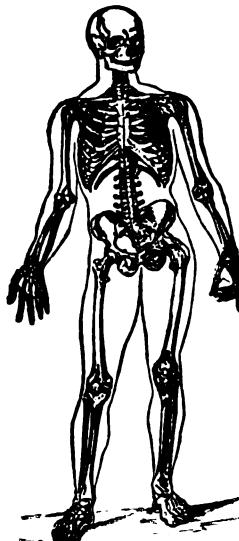
No. 9390.



No. 9396.



No. 9402.



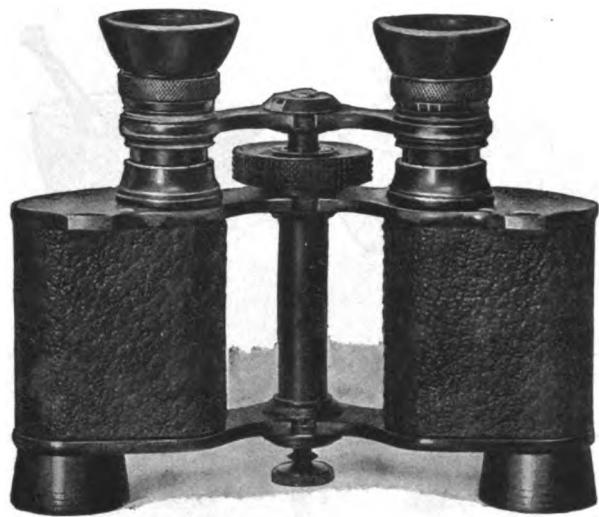
No. A1260.



No. F7331.

**MANIKIN, Minder Miniature**, 20 inches high. This is the same as the large one, except in size, and in the quality of paper. There are the same number of parts with the exception of the posterior muscles, which are not shown on the smaller manikin. A key, with all the parts named and numbered, is furnished. The folding plan is the same, the colors the same.

A1228. <b>MANIKIN, Minder Miniature, Sexless</b> .....	\$2.50
A1230. <b>MANIKIN, Minder Miniature, Female</b> .....	3.00
A1260. <b>HUMAN SKELETON</b> . Best grade, carefully selected, finely developed, perfectly cleansed and prepared, substantially articulated, with ring for suspension at top.....	75.00
A1264. <b>CASE FOR SKELETON</b> . Finely finished hardwood, glass door and sides, lock and key..	37.00
MOIST CHAMBERS, see Culture Dishes.	
MOISTURE TESTERS, see Grain Testing Apparatus.	
9388. <b>MORTARS, Glass, with pestle.</b>	
No. ....	A
Capacity, ounces .....	2
Diameter outside, inches.....	2 $\frac{3}{4}$
Each .....	.40
	B
Capacity .....	4
Diameter .....	4
Each .....	.50
	C
Capacity .....	8
Diameter .....	4 $\frac{1}{2}$
Each .....	.60
	D
Capacity .....	16
Diameter .....	5
Each .....	1.00
	E
Capacity .....	32
Diameter .....	6
Each .....	1.50
9390. <b>MORTARS, Iron, vase shape, heavy, with pestle.</b>	
No. ....	A
Capacity, pints .....	2
Size, inches .....	4 $\frac{1}{2}$ x5      5 $\frac{1}{2}$ x6      6 $\frac{1}{2}$ x6
Each .....	1.25      1.65      2.85
	B
Capacity .....	1
Size .....	8x7
Each .....	4.00
	C
Capacity .....	2
Size .....	10 $\frac{1}{4}$ x9
Each .....	8.80
9396. <b>MORTARS, Porcelain, with spout and pestle; glazed outside, rough inside.</b>	
Outside diameter, mm.....	65      80      100      130      150      165      185      213
Each .....	.35      .45      .55      .90      1.20      1.25      1.45      1.60
9402. <b>MORTARS, Wedgewood, acid proof, pestle with wood handle.</b>	
No. ....	0000      000      00      0      1      2      3      4      5      6
Diameter outside, inches....	3      3 $\frac{1}{2}$ 4      4 $\frac{1}{2}$ 5      5 $\frac{1}{2}$ 6 $\frac{3}{4}$ 7 $\frac{1}{4}$ 8      9
Each .....	1.00      1.15      1.25      1.40      1.50      1.80      2.05      2.15      2.50      3.05
F7331. <b>NATURE STUDY GLASS.</b> A well made glass for the observation of birds, etc. Magnifies about 5 diameters (25 to 30 times).....	6.50



No. F7351.

with an improved spring catch enabling case to be opened or closed with one hand. In addition to the outside carrying strap there is also an adjustable shoulder strap attached to the glass itself ..... \$40.00

**F7351. Prism Binocular, for Nature study.** This superior prism binocular meets a general demand for a "Stereo" instrument—an instrument increasing the sense of perspective—at a price considerably less than that of the more expensive makes, yet so well equipped mechanically and optically as instantly to command confidence.

**Specifications.**

Magnification ..... 8 diameters.  
Object glass ..... 1 inch.

Field of view at 1000 yards ..... 100 yards.  
Height ..... 5 inches.

Weight ..... 18 ounces.

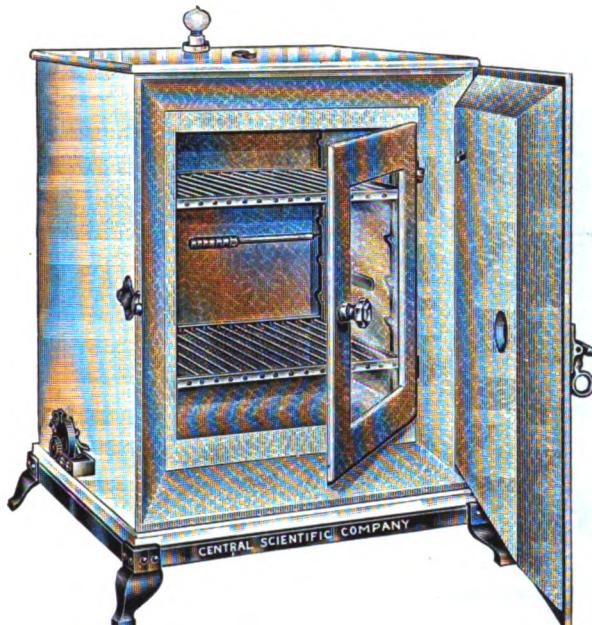
Body aluminum, japanned, and covered with black morocco leather. Eye-piece adjustable for different strength of eyes; adjustment for pupillary distance. Universal focusing attachment.

Furnished in a sole leather case, hand sewed and velvet lined, provided with an improved spring catch enabling case to be opened or closed with one hand. In addition to the outside carrying strap there is also an adjustable shoulder strap attached to the glass itself ..... \$40.00

**NOTE BOOKS, ATLAS SERIES**

This series consists of several tablets and covers, uniform in size ( $7\frac{3}{4} \times 9\frac{3}{4}$  inches) and perforated, specially arranged for laboratory use.

F8801.	<b>DRAWING TABLET, Drawing Paper</b> (Atlas No. 202). Specially prepared high grade paper, with perforations and marginal rulings. 30 sheets .....	.14
F8803.	<b>DRAWING TABLET, Ledger Paper</b> (Atlas No. 203). High grade ledger paper for pen and ink drawings, with perforations and marginal rulings. 30 sheets.....	.14
F8805.	<b>NOTE TABLET, Metrically Cross-ruled Paper</b> (Atlas No. 204). Accurately ruled, being printed from an engraved plate, with heavy lines enclosing a square centimeter and light lines a space of 2 millimeters square. Has note ruling and marginal line on opposite side; perforated. 60 sheets .....	.17½
F8807.	<b>NOTE TABLET, Ruled Paper</b> (Atlas No. 201). With perforations and marginal ruling. 30 sheets .....	.10½
F8809.	<b>NOTE TABLET, Unruled Paper</b> (Atlas No. 200). With perforations. 30 sheets.....	.10½
F8811.	<b>NOTE BOOK COVERS.</b> Complete set, including front and back boards, with flexible cloth eyeleted hinge, lace fasteners, and instructions.	
	No. .... A      B      C      D      E      F      G      H	
	Atlas No. .... 101      104      146      149      143      110      107      119	
	For note book No.... F8813      F8815      F8817      F8819      F8821      F8823      F8825      F8827	
	Each ..... .09      .09      .09      .09      .09      .09      .09      .09	
F8813.	<b>NOTE BOOK, Biology</b> (Atlas No. 1), complete, including No. F8811A Covers, No. F8801 Drawing Tablet and No. F8807 Note Tablet.....	.31½
F8815.	<b>NOTE BOOK, Botany</b> (Atlas No. 4), complete, including No. F8811B Covers, No. F8801 Drawing Tablet and No. F8807 Note Tablet.....	.31½
F8823.	<b>NOTE BOOK, Physiology</b> (Atlas No. 10), complete, including No. F8811F Covers, No. F8801 Drawing Tablet and No. F8807 Note Tablet .....	.31½
F8825.	<b>NOTE BOOK, Zoology</b> (Atlas No. 7), complete, including No. F8811G Covers, No. F8801 Drawing Tablet and No. F8807 Note Tablet.....	.31½
F8827.	<b>NOTE BOOK, Plain</b> (Atlas No. 19), name of subject not printed, complete, including No. F8811H Covers, No. F8801 Drawing Tablet and No. F8807 Note Tablet.....	.31½
	<b>HERBARIUMS.</b> Made in two sizes, $7\frac{3}{4} \times 9\frac{3}{4}$ inches, and $11 \times 17$ inches, uniform in design with the Atlas Note Books. The portfolio form permits the specimens to be mounted scientifically according to the genus and species to which they belong. The plan also permits adding to or removing from the collection at any time. Hints on collecting, pressing and mounting specimens are found on inside cover pages. Each sheet contains a legend for classification, and an index is furnished. No.....	A      B
	Atlas No. ....	709      1117
	Size, inches .....	$7\frac{3}{4} \times 9\frac{3}{4}$ $11 \times 17$
	No. of sheets.....	40      25
F8841.	<b>HERBARIUM</b> , complete as described above.....	.32      .56
F8842.	<b>HERBARIUM COVERS</b> only.....	Per set      .12      .20
F8843.	<b>MOUNTING SHEETS</b> only.....	Per 100      .42      1.40
F8847.	<b>PLANT DESCRIPTION PAPER</b> , with spaces on one side for complete analysis of a plant; the other side unruled. $7\frac{3}{4} \times 9\frac{3}{4}$ inches, perforated for Nos. F8811 or F8842A Covers. In envelope of 20 sheets.....	Per envelope      .08



Nos. 9830-1 (Patented).

DeKhotinsky Bimetallic Thermo-  
Regulator.  
(Patent applied for.)

## OVENS, DRYING, ELECTRICALLY HEATED AND REGULATED

**OVENS, Drying, Triple Wall, DeKhotinsky, Electrically Heated and Regulated (Patented),** with new bimetallic regulator and new system of ventilation providing for greatest possible uniformity of temperature throughout the oven chamber.

**Construction:** These ovens are constructed of asbestos board on a steel frame, with three walls. The space between the outer walls is packed with magnesia-asbestos (magnesia 85 per cent.; asbestos 15 per cent.) Between the inner walls is an air space through which the air passes upward from the heating units in the base. Ports are provided in the side walls of this air space, permitting the entrance of the heated air to the oven chamber, in which it passes up and out through an opening in the false top. The location of these ports has been carefully and scientifically determined so as to provide a continuous current of heated air to every corner of the inner chamber, making the temperature uniform throughout. This feature (patent pending) is peculiar to the DeKhotinsky Triple Wall Oven, and insures a uniformity not possible in electrically heated ovens of any other type. The outer door is double walled and packed with magnesia-asbestos. It is beveled on the edges, making close contact, when closed, with the walls, thus preventing leakage of heat. An inner glass door is provided for inspection of the interior without cooling the contents. Between it and the outer door is a dead air space for insulation purposes.

Heating of the oven is effected by means of four of our standard heating units of chromel wire wound on lavite. These heating units are located in the base of the oven between the two bottoms with an iron deflector placed over them to prevent radiation of heat from the units into the inner chamber. Three of these heating units are connected in parallel to the switch contact springs, and may be added to the circuit one at a time as desired. The fourth is connected in circuit with the contact points of the thermo-regulator. These heating units can be easily and quickly replaced.

Temperature control of the oven is secured by means of our new bimetallic thermo-regulator which is made from invar-brass ribbon, and can be set at any desired temperature from that of the surrounding air up to the maximum heat capacity of the oven. This range of temperature permits the use of these instruments as ovens, paraffine baths, or sterilizers. The precision of action of this thermo-regulator is  $\frac{1}{4}^{\circ}\text{C}$ . The make-and-break contact of the thermo-regulator is located outside the oven to prevent the possibility of ignition of inflammable gases developed in the inner chamber, which often occurs when the contact is made and broken inside. A pilot lamp on top of the oven is connected in series with the thermo-regulator, enabling the operator to determine at a glance whether the oven is regulating.

These instruments can be operated on either A.C. or D.C. circuits.

No.		A	B	C
	Height inside, inches.....	10 $\frac{1}{2}$	14 $\frac{3}{4}$	19 $\frac{3}{4}$
	Width inside, inches.....	7	12	17
	Depth inside, inches.....	6 $\frac{1}{2}$	11 $\frac{3}{4}$	14
	Shelf space, square inches.....	91	282	476
9830.	For 110 volts.....	\$70.00	110.00	185.00
9831.	For 220 volts.....	72.50	112.50	187.50



Nos. 9846-7 (Patented).

**EXTRA HEATING UNITS** for Nos. 9830-9831.

		B	D	E
	No. ....	A	B	C
	For oven No. ....	60	115	140
	Wattage ....			
7526.	For 110 volts....	1.00	1.00	1.00
7527.	For 220 volts....	1.25	1.25	1.25

**9838. FUSES** for Nos. 9830-1, enclosed cartridge type, 250 volts.

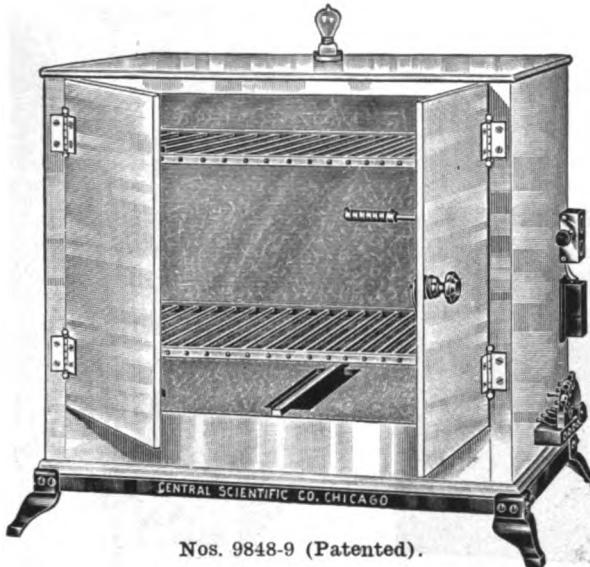
For size.....	A-B	C
Amperes .....	6	10
Each .....	.15	.15

**Note:**—We shall be glad to quote prices on request upon our DeKhotinsky Electrically Heated and Regulated Drying Ovens for temperatures higher than 180°C. Kindly specify both maximum and minimum temperatures at which they are to be used.

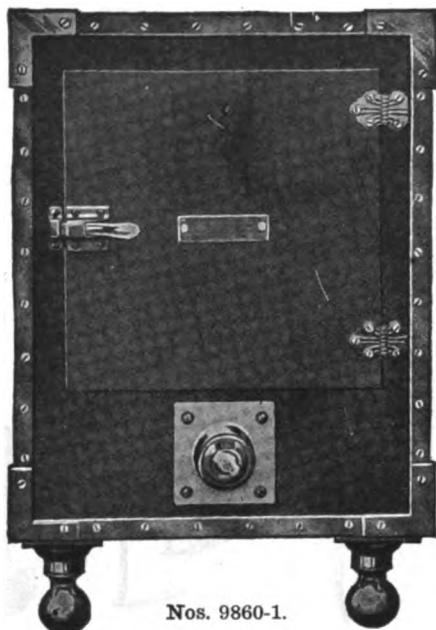
**OVENS, Drying, Single Wall, DeKhotinsky, Electrically Heated and Regulated (Patented),** with new bimetallic regulator and new system of ventilation providing for greatest possible uniformity of temperature throughout the oven chamber obtainable in a single walled drying oven. For work requiring the greatest precision of regulation and uniformity of temperature, we recommend our DeKhotinsky Triple Wall Drying Oven. (See description under No. 9830.)

**Construction:** The oven is built of  $\frac{1}{4}$ -inch asbestos board on a steel frame with a foundation of  $\frac{3}{8}$ -inch asbestos board. To effect the greatest uniformity of temperature possible in an oven of the single walled type, the heating units are placed between two bottoms, the upper bottom being protected from the direct heat of the units by an iron deflector. Air heated by the units passes back between the bottoms, up through the space between the double back to the upper part of the oven, and after circulating through the oven chamber returns to the inter-bottom space by way of an opening in the front part of the false bottom. This feature (patent pending) is peculiar to the DeKhotinsky Single Wall Drying Oven and insures a uniformity not possible in other types. Two shelves of the grid type are provided, which, by means of racks, may be set at any desired height. The oven is mounted on a japanned steel base.

Heating of the oven is effected by means of six of our standard heating units of 115 watts each, two of which are permanently connected to the connecting receptacle of the oven, three to the switch contact springs, and the remaining one—the heat-regulating unit—is in circuit with our bimetallic thermo-regulator for automatic control of the desired temperature. The system is fused for protection.



Nos. 9848-9 (Patented).



Nos. 9860-1.

**OVENS, Drying, Single Wall, DeKhotinsky, Continued.**

**Temperature Control:** Our new bimetallic thermo-regulator is made from invar-brass ribbon, and can be set at any desired temperature from that of the surrounding atmosphere to the maximum heat capacity of the oven, about 140°C. The precision of action of this thermo-regulator is  $\frac{1}{4}$  °C. The make-and-break contact of the thermo-regulator is located outside the oven to prevent the possibility of ignition of inflammable gases developed in drying, which often occurs when the contact is made and broken inside the oven. A pilot lamp on top of the oven is connected in series with the thermo-regulator, enabling the operator to determine at a glance whether the oven is regulating.

These ovens can be operated on either A.C. or D.C. circuits.

**DRYING OVENS, Single Wall, DeKhotinsky, Electrically Heated and Regulated,** as described above, complete with two extra cartridge fuses, Hubbell receptacle, and 5 feet of flexible asbestos covered cord with separable Hubbell attachment plug.

	Width, Inches	Depth, Inches	Height, Inches	Vol. Inside, Cu. Inches	Shelf Space, Sq. Inches	Voltage, A.C. & D.C.	Price
9846.	11	10	12	1320	220	110	\$60.00
9847.	11	10	12	1320	220	220	62.50

**DRYING OVENS, Single Wall, DeKhotinsky, Electrically Heated and Regulated,** of same construction as No. 9846, but larger, with two doors and with twelve 115-watt heating units. With same equipment as No. 9846.

	Width, Inches	Depth, Inches	Height, Inches	Vol. Inside, Cu. Inches	Shelf Space, Sq. Inches	Voltage, A.C. & D.C.	Price
9848.	18	12	14	3024	430	110	90.00
9849.	18	12	14	3024	430	220	92.50

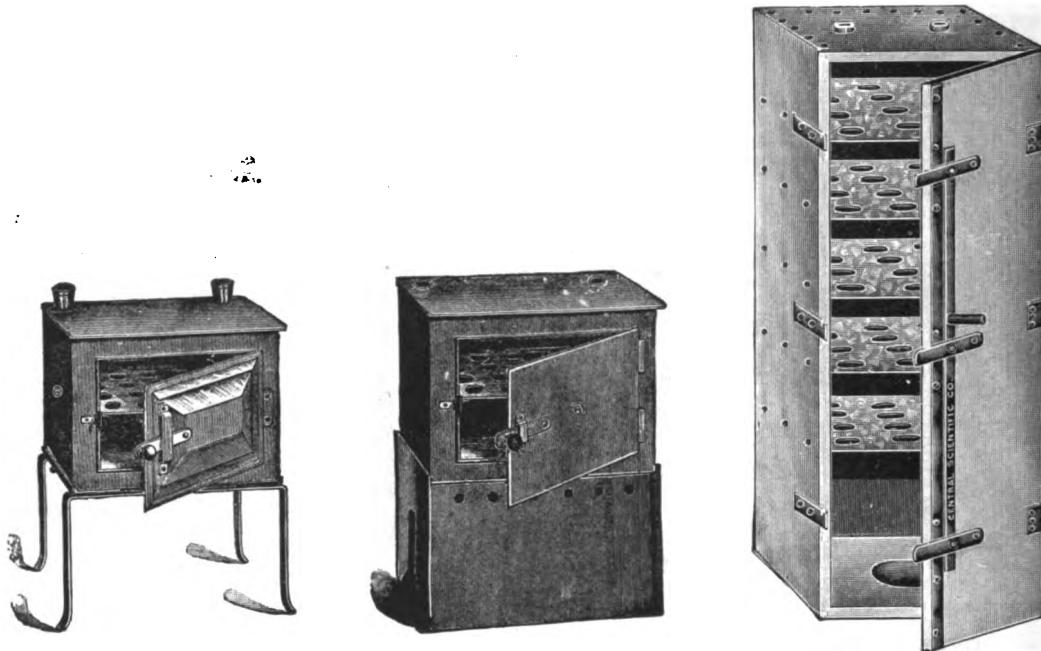
**EXTRA HEATING UNITS** for Nos. 9846 to 9849, 115 watt capacity. No. 7526D 7527D

For volts .....	.....	110	220
Each .....	.....	1.00	1.25

9850. FUSES, for Nos. 9846 to 9849, enclosed cartridge type, 250 volts. No.....	A	B
Amperes .....	.....	10 15
Each .....	.....	.15 .15

**OVENS, Drying, Despatch Electric,** especially designed for moisture determinations in soils, flour, etc. They are practically uniform in temperature, having a three-point regulating switch, whereby the temperature can be held at 212°F. Provided with top and bottom ventilators, which greatly expedite the drying process. Made of polished steel with angle iron corner construction, and with all fittings nickel-plated, with 1-inch solid heat retaining walls of asbestos, and Despatch Open Wire Electric Heaters, wound with special alloy which will not oxidize nor become brittle. Complete with four removable screen shelves and tested thermometer. No.....

Outside dimensions, inches.....	14x14x18	14x16x18	16x20x20
Inside dimensions, inches.....	11x6x16	12x9x16	13x12x18
Size of door, inches.....	6x11	9x11	12x13
Number of shelves.....	2	3	4
Current consumption first heating, watts.....	200	200	250
Current consumption continuous, watts.....	100	100	150
9860. For 110 volts.....	83.00	88.00	94.00
9861. For 220 volts.....	83.00	88.00	94.00



Nos. 9880 and 9884.

Nos. 9882 and 9886.

No. 9900.

### OVENS, DRYING, FOR GAS OR OIL HEAT

**9880. OVENS, Drying, Single Wall**, of heavy polished copper with tubulations for thermometer and gas regulator, mounted on heavy cast iron support with false bottom of sheet iron to protect the copper. With two removable perforated shelves.

No.	A	B	C	D	E
Outside dimensions, inches.....	6x8x6	8x10x8	10x12x10	18x24x18	18x36x18
Each .....	\$8.00	11.00	17.00	48.00	75.00

**9882. OVENS, Drying, Single Wall**, same as No. 9880, but with enclosed sheet iron base.

No.	A	B	C	D	E
Outside dimensions, inches.....	6x8x6	8x10x8	10x12x10	18x24x18	18x36x18
Each .....	9.00	13.00	19.50	52.00	80.00

**9884. OVENS, Drying, Double Wall**, same as No. 9880, but with water jacket, with tubulations for thermometer and gas regulator. With two shelves.

No.	A	B	C
Outside dimensions, inches.....	6x8x6	8x10x8	10x12x10
Inside dimensions, inches.....	4 1/4 x 6 1/4 x 5 1/4	6 1/4 x 8 1/4 x 7 1/4	8 1/4 x 10 1/4 x 9 1/4
Each .....	11.00	15.50	23.00
No.	D	E	
Outside dimensions, inches.....	18x24x18	18x36x18	
Inside dimensions, inches.....	16 1/4 x 22 1/4 x 17 1/4	16 1/4 x 34 1/4 x 17 1/4	
Each .....	65.00	100.00	

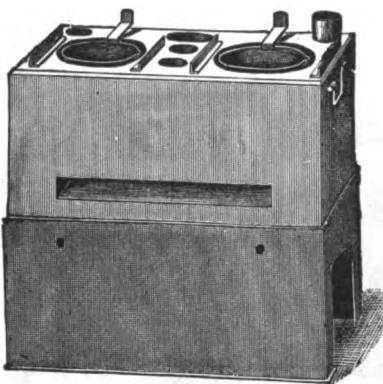
**9886. OVENS, Drying, Double Wall**, same as No. 9884, but with enclosed sheet iron base.

No.	A	B	C	D	E
Outside dimensions, inches.....	6x8x6	8x10x8	10x12x10	18x24x18	18x36x18
Each .....	12.00	17.50	25.50	69.00	105.00

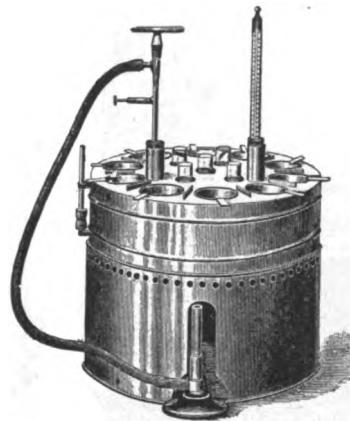
**9887. WATER GAGE**, fitted to any Double Wall Drying Oven Nos. 9884-6.....add 3.00

**9888. WATER LEVEL, Kekule**, fitted to any Double Wall Drying Oven Nos. 9884-6.....add 3.25

**9900. OVEN, Drying, Single Wall, Asbestos**, of the type used in the United States Bureau of Soils. Substantially made of heavy asbestos board, 13 inches deep, 18 inches wide, and 48 inches high. Openings are provided at the top for thermometer and gas regulator and near the bottom for gas inlet tube. Very satisfactory for drying large quantities of soil samples. Complete with 5 removable shelves of woven wire ..... 75.00



No. 10100.



No. 10102.

9980. **PAILS**, White Enamelled, Seamless, with cover of same, for laboratory waste. Capacity, 3 gallons ..... each \$3.50

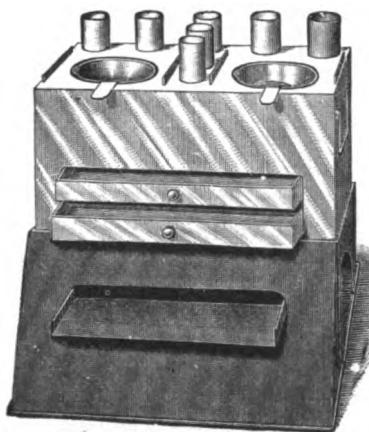
9998. **PAPER**, Carborundum, in sheets 9x11 inches.

No. ....	000	00	0	1
Per sheet .....	.06	.06	.06	.08
Per quire .....	1.25	1.25	1.25	1.60
10000. <b>PAPER</b> , Congo Red, in sheets 11x17 inches.....			Per sheet	.06
			Per quire	1.10
10008. <b>PAPER</b> , Litmus, blue, in sheets 8x10 inches.....			Per sheet	.06
			Per quire	1.10
10010. <b>PAPER</b> , Litmus, blue, in books of 50 strips.....			Per book	.06
			Per dozen books	.60
10012. <b>PAPER</b> , Litmus, blue, in glass vials containing 100 strips.....			Per vial	.12
			Per dozen vials	1.15
10016. <b>PAPER</b> , Litmus, neutral, in sheets 8x10 inches.....			Per sheet	.06
			Per quire	1.10
10018. <b>PAPER</b> , Litmus, neutral, in books of 50 strips .....			Per book	.06
			Per dozen	.60
10020. <b>PAPER</b> , Litmus, neutral, in glass vials containing 100 strips.....			Per vial	.12
			Per dozen	1.15
10024. <b>PAPER</b> , Litmus, red, in sheets 8x10 inches.....			Per sheet	.06
			Per quire	1.10
10026. <b>PAPER</b> , Litmus, red, in books of 50 strips.....			Per book	.06
			Per dozen books	.60
10028. <b>PAPER</b> , Litmus, red, in glass vials containing 100 strips.....			Per vial	.12
			Per dozen vials	1.15
10032. <b>PAPER</b> , Logwood, in sheets 11x17 inches.....			Per sheet	.06
			Per quire	1.10
10036. <b>PAPER</b> , Paraffin, in sheets 12x18 inches.....			Per quire	.35
10040. <b>PAPER</b> , Parchment, vegetable, in sheets 18x24 inches.....			Per sheet	.06
			Per quire	.70
10046. <b>PAPER</b> , Sand, in sheets 9x11 inches.				
No. ....	00	0	1	3
Per sheet .....	.05	.05	.06	.10
Per quire .....	.55	.55	.60	1.20
10050. <b>PAPER</b> , Turmeric, in sheets 11x17 inches.....			Per sheet	.08
			Per quire	1.35
10052. <b>PAPER</b> , Turmeric, in books of 50 strips.....			Per book	.07
			Per dozen books	.75

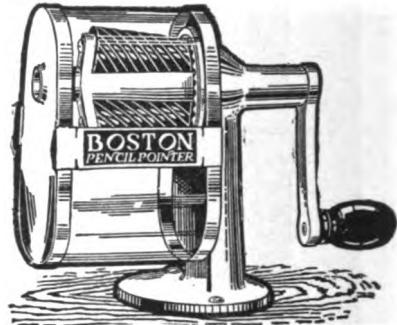
### PARAFFINE BATHS AND OVENS

10100. **PARAFFINE BATH**, simple form, made of polished copper, 7 inches long, 3 $\frac{3}{4}$  inches wide, and 3 $\frac{1}{2}$  inches deep, with extra sheet iron bottom and iron base 5 inches high. It is provided with a space for heating slides, and two nickel-plated cups. The shallow cup is 2 $\frac{1}{2}$  inches in diameter and  $\frac{3}{4}$  inch deep, watch glass shape, and the deep one is 2 $\frac{1}{8}$  inches in diameter and 1 $\frac{1}{2}$  inches deep. With tubulations for thermometer, gas regulator and for three test tubes. Without burner, thermometer, or regulator ..... 12.00

10102. **PARAFFINE BATH**, round form, of polished copper, 12 $\frac{1}{2}$  inches in diameter, 3 $\frac{1}{2}$  inches deep, with sheet iron base 7 $\frac{1}{2}$  inches high. There are ten cups, seven of deep form, 2 $\frac{1}{8}$  inches in diameter and 1 $\frac{1}{2}$  inches deep, and three shallow, 2 $\frac{1}{8}$  inches in diameter and  $\frac{3}{4}$  inch deep, watch glass shape. With five tubulations in the top for glass tubes, and tubulations for thermometer and gas regulator. Without burner, thermometer, or regulator..... 25.50



No. 10114.

No. 10122.  
Size 3P.

No. 10164.

**10114. PARAFFINE BATH, Miller**, of polished copper, 8 inches long, 4 inches wide and 4 inches deep, provided with an extra sheet iron bottom to prevent burning out, and an iron base 5 inches high. The bath has two nickel-plated cups, one shallow and one deep. The shallow cup is  $2\frac{1}{8}$  inches in diameter and  $\frac{3}{4}$  inch deep, watch glass shape, and the deep one is  $2\frac{1}{8}$  inches in diameter and  $1\frac{1}{2}$  inches deep. Complete with two drawers to hold slides, and with tubulations for thermometer, gas regulator and for five test tubes, but without burner, thermometer or regulator..... \$18.50

**PARAFFINE EMBEDDING OVENS, Wood Frame, Electrically Heated and Regulated**, of same construction as No. 7908 Incubators, but with thermostat adjusted and tested at  $56^{\circ}\text{C}$ . before shipment. For full description see No. 7908.

No.	2P	3P	11P	31P	32P	41P
Height inside, inches.....	26	12	15	30	26	30
Width inside, inches.....	18	9	12	20	18	20
Depth inside, inches.....	18	9	$10\frac{1}{2}$	18	18	18
Number of shelves.....	1	1	1	3	1	3
Doors .....	double	single	double	double	double	double
Height of stand, inches.....					32	32
Shipping weight, pounds.....	145	22	38	175	180	220
10122. For 110 volts.....	79.00	29.00	48.00	90.00	91.50	102.50
10123. For 220 volts.....	79.00	29.00	48.00	90.00	91.50	102.50

**10124. PARAFFINE RECEPTACLE** for use in Nos. 10122 and 10123, when used as Paraffine Ovens. Constructed of steel with three-inch legs of same material. Top and bottom are of  $\frac{3}{16}$  inch transite; the 5 shelves are of perforated metal, each shelf having 9 holes  $2\frac{1}{16}$  inches in diameter for paraffine cups. Height, 13 inches; width, 14 inches; depth, 14 inches; shipping weight, 30 pounds. This receptacle can be purchased separately for use in Paraffine Ovens Nos. 2P, 31P, 32P and 41P, or if ordered together, the receptacle will be fitted in place. Complete with 45 paraffine cups..... \$50.00

**PARAFFINE EMBEDDING BOX**, see No. 8934.

**PARAFFINE EMBEDDING TABLE**, see No. 8936.

**4242. PENCILS, DRAWING**, Faber, polished.

No.....		A	B	C
Each .....				

**10156. PENCIL**, Litmus, made like an ordinary lead pencil, one end blue, the other end red..... .40

**10160. PENCILS, Wax**, for writing on glass, porcelain, etc.

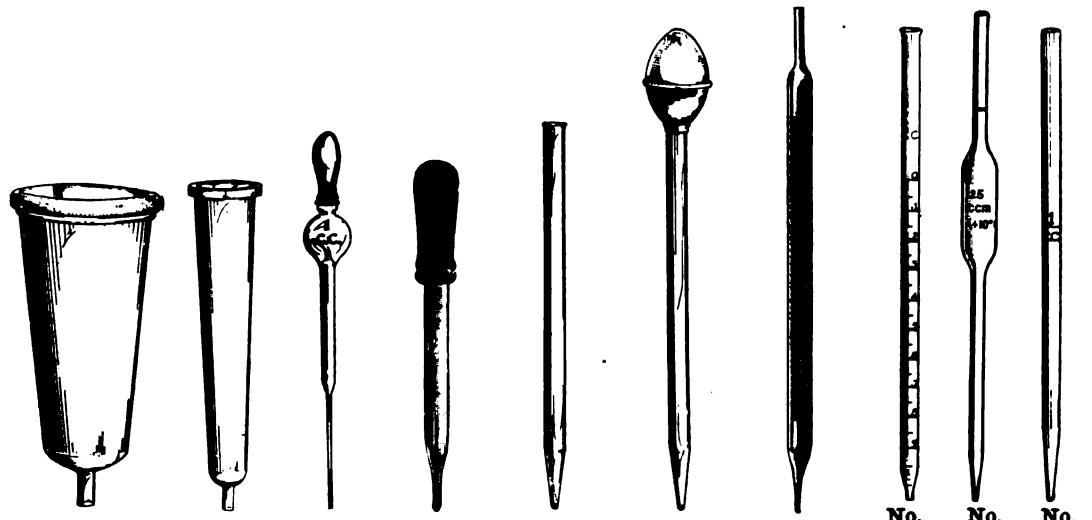
No.....		A	B	C
Color .....		blue	red	yellow
Each .....		.15	.15	.15

**10162. PENCILS, Wax Crayons**, for marking on glass, porcelain, alundum, etc. Need no sharpening and the marks do not run when heated. The blue burns to an indelible mark on porcelain.

No.....		A	B	C
Color .....		black	blue	red
Each .....		.06	.06	.06
Per dozen .....		.60	.60	.60

**10164. PENCIL SHARPENER**, Boston. Simple and durable; for standard size pencils. Celluloid box holds dust and shavings. New cutters readily inserted .....

\$1.60



No. 10170. No. 10174. No. 1320. No. 10476. No. 10480. No. 10481. No. 10496. No. 10506. No. 10514. 10516.

**10170. PERCOLATORS, conical, heavy glass.**

Capacity, pints.....		1	2
Each .....	\$0.65.	.80	
Capacity, gallons.....	$\frac{1}{2}$	1	2
Each .....	1.00	1.75	3.25

**10174. PERCOLATORS, Oldberg's, heavy glass, narrow form, almost cylindrical.**

Capacity, pints .....	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Each .....	.60	.75	.80	1.05	1.20
Capacity, gallons .....		$\frac{1}{2}$	1	2	
Each .....		1.45	2.50	4.50	

10448. PINS, ordinary, stiff and sharp pointed, in  $\frac{1}{2}$  pound boxes..... Per box 1.00**PIPETTES**

1320. PIPETTE, Automatic Dropping, with rubber bulb, for delivering exactly 1 cc. Convenient for filling ampoules ..... 1.10

10476. PIPETTES, Dropping, Medicine Droppers, with rubber bulb. Length, 4 inches; capacity, about 2 cc..... Per dozen .35

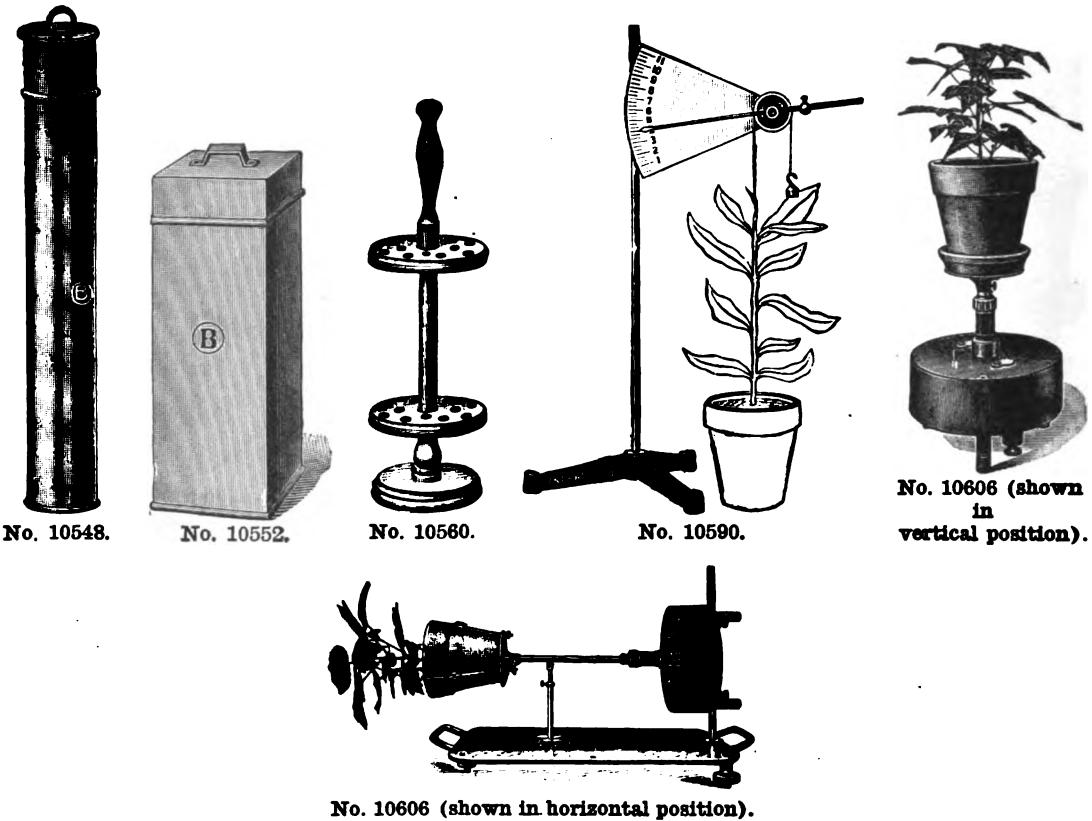
10477. PIPETTES, Dropping, same as No. 10476, but with tip curved..... Per dozen .35

10480. PIPETTES, Dropping, straight, without bulb.  
Length, inches ..... 8 | 12 |Each ..... .16 | .20 |10481. PIPETTES, Dropping, same as No. 10480, but with rubber bulb of 25 cc capacity.  
Length, inches ..... 8 | 12 |Each ..... .38 | .42 |

10496. PIPETTES, Mohr's, accurately graduated in cc and fractions.

No. ....	A	B	C	D	E	F	G	H	J	K
Capacity, cc.....	$\frac{1}{10}$	1	1	2	5	10	20	25	50	100
Graduated to, cc.....	$\frac{1}{100}$	$\frac{1}{100}$	$\frac{1}{10}$							
Each .....	.35	.45	.35	.35	.40	.45	.55	.60	1.00	1.10

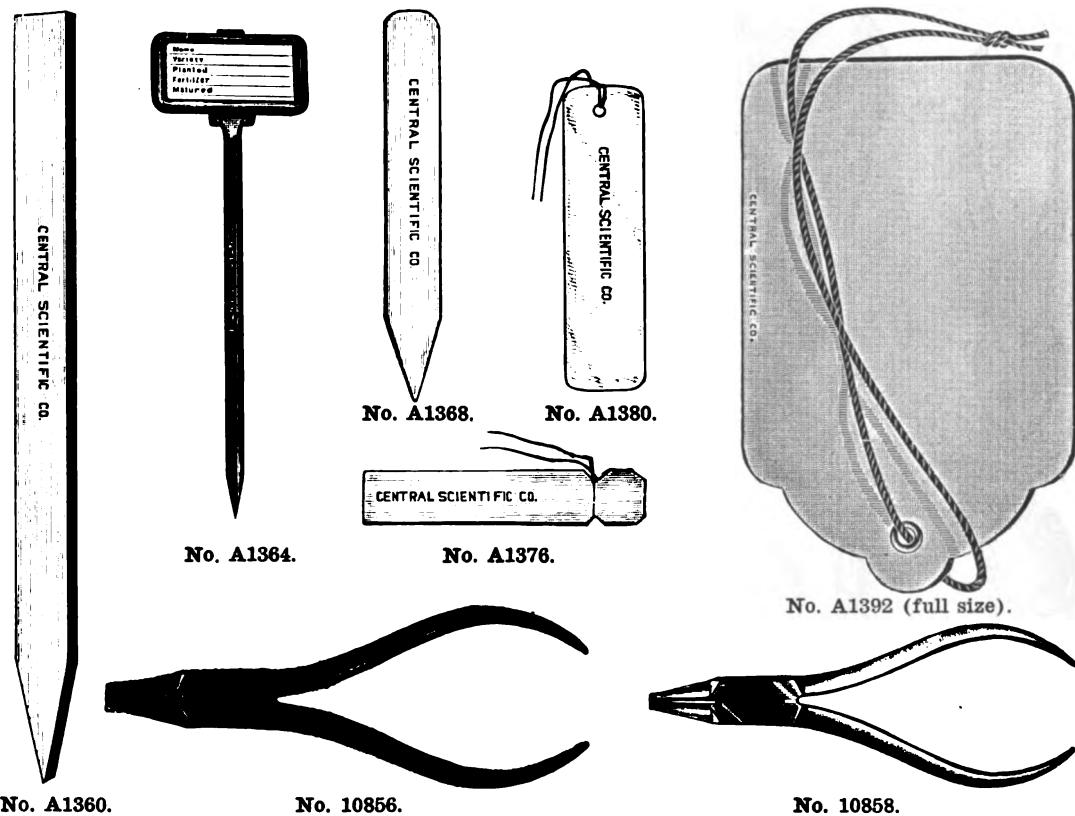
10506. PIPETTES, Serological, similar to No. 10496, but graduated to the extreme tip.  
No. .... A B C D E  
Capacity, cc ..... $\frac{1}{10}$ | 1 | 1 | 5 | 10 |Graduated to, cc..... $\frac{1}{100}$ | $\frac{1}{100}$ | $\frac{1}{10}$ | $\frac{1}{10}$ | $\frac{1}{10}$ |Each ..... .35 | .45 | .35 | .40 | .45 |10514. PIPETTES, Volume or Transfer, with bulb approximately in middle of tube.  
Capacity, cc..... 1 2 3 5 10 12 15 20 25 30 50 75 100 200  
Each ..... .10 | .15 | .15 | .16 | .18 | .22 | .24 | .26 | .30 | .32 | .36 | .45 | .55 | .65 |10516. PIPETTES, Volume or Transfer, without bulb, as used in bacteriological work and water analysis.  
Capacity, cc .....  |  |  |  |  |  |  |  | 1 | 5 | 10 |Each .....  |  |  |  |  |  |  |  | .15 | .15 | .17 |



10548. PIPETTE BOX, cylindrical, for use in sterilizing pipettes, of sheet copper, with tightly fitting cover with handle. Length, 15 inches; diameter, 2 inches.....	\$2.50
10549. PIPETTE BOX, cylindrical, same as No. 10548, but made of sheet iron.....	2.10
10552. PIPETTE BOX, rectangular form, of sheet copper, with overhanging cover with handle. Size, 2x2x12½ inches .....	4.00
10560. PIPETTE SUPPORTS, of hardwood, revolving, for 12 pipettes.....	4.25

### PLANT PHYSIOLOGY APPARATUS

10590. AUXANOMETER, a simple and practical apparatus for measuring plant growth. A silk thread attached to the plant passes over a pulley with which it is held in close contact by a weight. This pulley moves freely and the pointer attached to it is provided with a counterbalance. The scale is accurately divided, each division representing a growth of .01 inch, and may be placed at any desired height on the support rod .....	8.00
10606. CLINOSTAT, for investigations involving plants of moderate weight where great precision of revolution is not required. It consists essentially of the works of a powerful eight-day clock, geared to a revolution in fifteen minutes and enclosed in a practically dust and moisture-proof case, 16 cm in diameter. A ball-bearing shaft takes the strain from the works, which are started and stopped by a cylindrical nut projecting from the upper surface. It is to be wound, not too tightly, once in two days, which may be accomplished without disturbing the plant. Properly used it will carry a 4-inch or smaller pot horizontally, or a larger size vertically. As with all clinostats, however, it revolves with greater evenness the smaller the weight it has to carry, and consequently the smallest pots allowed by the subject under study should be used. The size with which the instrument works best is the three-inch, this size, however, being larger than commonly supposed, since the measurements of pots are all internal. Complete as described with directions for use.....	25.00



A1360. **PLANT LABEL**, Cypress, for use outside; will last for years. Size 16x1 $\frac{1}{4}$  inches. Per dozen \$0.60  
Per hundred 4.30

A1364. **PLANT LABEL**, Iron, heavily japanned. Length of stem 7 inches; label 1 $\frac{1}{2}$ x2 $\frac{1}{2}$  inches, protected by mica sheet, and readily removable ..... Each .35

A1368. **PLANT LABEL**, Wood, for pots.

No.	A	B	C
Length, inches	4	6	8
Per hundred	.25	.40	1.00

A1376. **TREE LABEL**, Wood,  $\frac{5}{8}$ x3 $\frac{1}{2}$  inches, with copper wire ..... Per hundred .35

A1380. **TREE LABEL**, Aluminum, 1x3 $\frac{3}{4}$  inches, with copper wire..... Per dozen .50

A1392. **TAG**, Paper, of extra thick tough stock with a fine writing surface. Each tag has a metal eyelet and a loop of the best twine..... Per hundred .50

A1400. **PLANT FOOD, PERFECT**, in compressed tablets, according to the formula of Prof. Julius von Sachs. .... Per box of 25 .25

10696. **PLATES**, Glass, square, for covering jars, beakers, etc. Edges not ground.

Length of side, mm	50	75	100	150	200	250
Each	.03	.05	.08	.15	.25	.30
Per dozen	.30	.50	.80	1.50	2.50	3.00

10698. **PLATES**, Glass, square, same as No. 10696, but of double thick glass and ground on one side. Edges not ground. No..... A B C D E F

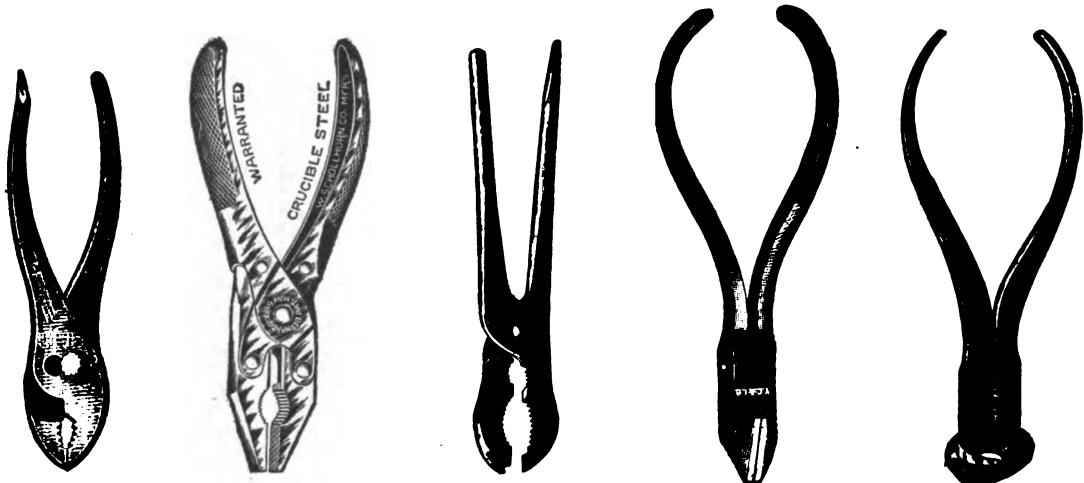
Length of side, mm	50	75	100	150	200	250
Each	.04	.06	.10	.18	.30	.45
Per dozen	.40	.60	1.00	1.80	3.00	4.50

10856. **PLIER**s, flat nose.

Length, inches	5	6
Each	.90	.95

10858. **PLIER**s, round nose.

Length, inches	5	6
Each	1.00	1.40



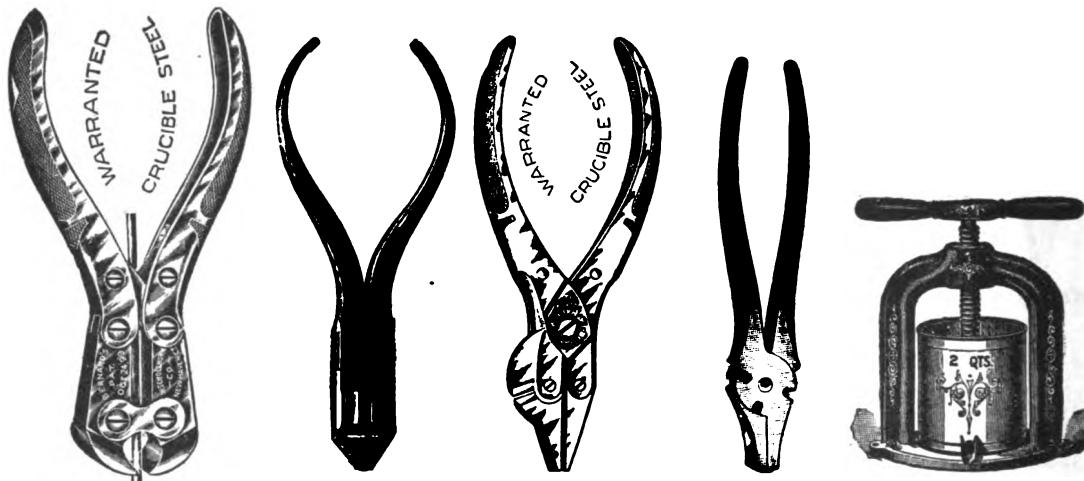
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No. 10864.

No. 10866.

No. 10868.

No. 10870.



No. 10872.

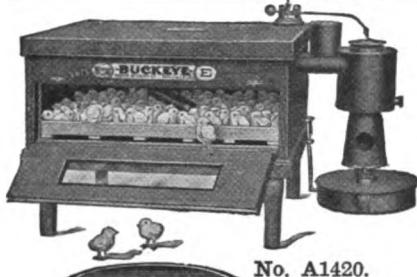
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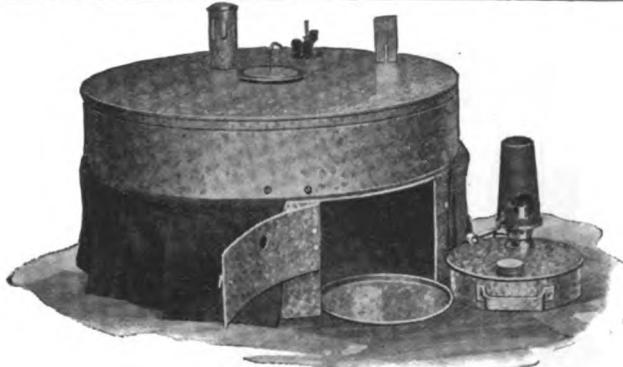
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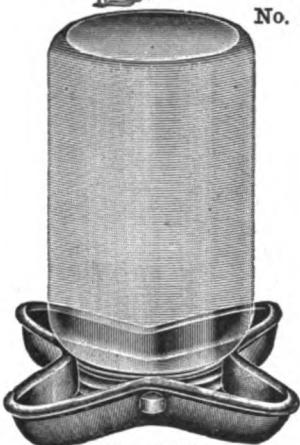
10862. <b>PLIERS, Combination.</b>	Gas plier, wire cutter, wrench and screw driver combined. Drop forged from high grade tool steel and warranted free from defects. Nickel-plated. A very useful tool.					
Length, inches .....	6	10				
Each .....	\$0.60	.80				
10864. <b>PLIERS, Combination.</b>	A flat nose gas plier and wire cutter combined. Open throat, parallel jaws, full nickel-plated. Length, 5½ inches .....					2.00
10866. <b>PLIERS, Gas,</b> cast steel, fine quality. Length, 9 inches.....						.80
10868. <b>PLIERS, Nippers, Diagonal Cutting,</b> convenient for cutting in places difficult of access.						
Length, inches .....	5	6				
Each .....	1.80	1.90				
10870. <b>PLIERS, Nippers, End Cutting,</b> 6-inch.....						1.30
10872. <b>PLIERS, Nippers, End Cutting,</b> Bernard's, 6-inch, open throat jaws, nickel-plated, interchangeable parts. Its compound system of leverage makes this tool a very powerful cutter..						3.20
10874. <b>PLIERS, Wire Cutting.</b> Flat nose, side cutting pliers.						
Length, inches .....	5	6				
Each .....	1.25	1.40				
10876. <b>PLIERS, Wire Cutting, Bernard's.</b> Open throat, parallel jaws, nickel-plated.						
Length, inches .....	4½	5½				
Each .....	2.20	2.50				
10878. <b>PLIERS, Wire Cutting,</b> Button's patent.						
Length, inches .....	4½	6				
Each .....	.60	.75				
10962. <b>PRESSES, Tincture,</b> extra heavy, for making tinctures, extracts, etc.						
Capacity, quarts .....	1	2	4	8		
Each .....	9.00	10.00	11.00	15.00		



No. A1420.



No. A1426.



No. A1432.



No. A1430.



No. A1436.

## POULTRY HUSBANDRY

**A1420. INCUBATOR, Buckeye No. 14,** for table use, with oil heater and thermostatic control. This incubator is carefully constructed of California redwood with double top, with insulation between the two layers. It is provided with a hot water heating system with large boiler, constructed of a heavy rust resisting metal. The boiler is heated by an all metal oil lamp which will not smoke. The temperature is automatically controlled by means of a metal thermostat, which operates to allow more or less heat to escape through a valve at the top of the burner flue. Dimensions of case: Length, 21 inches; width, 17 $\frac{1}{2}$  inches; height without legs, 10 $\frac{1}{2}$  inches; height of legs, about 5 inches. Capacity, 65 eggs; shipping weight, 55 pounds.

Complete with oil lamp, incubator thermometer and holder, egg tray for 65 eggs and egg tester, with directions for use. . . . . \$15.00

**A1422. INCUBATOR, Buckeye,** similar to No. A1420, but of double wall construction throughout, with double door with glass windows. The heating system is made of pure copper and the burner is of the enclosed type, bearing the Underwriters' label, insuring freedom from danger of fire. With same equipment as No. A1420. No. . . . .

	A	B
Capacity, eggs . . . . .	120	175
Dimensions without legs, inches . . . . .	$25\frac{1}{2} \times 25\frac{1}{2} \times 11\frac{1}{2}$	$30\frac{1}{2} \times 30\frac{1}{2} \times 11\frac{1}{2}$
Height of legs, inches . . . . .	20	20
Shipping weight, pounds . . . . .	110	135
Each . . . . .	34.00	39.50

**A1426. BROODER OR HOVER, Prairie State Junior,** portable type. This hover is assembled in one compact piece, self-contained, and is light, rendering it easily portable. It is constructed of galvanized steel throughout, with the top in one piece with steel rim projecting downward. A double curtain of cotton duck, attached to the bottom by a wire, is draped to the floor, the length being adjustable to 7 $\frac{1}{2}$  inches. Slits at the bottom permit the passage of the chicks freely. The top is insulated by a  $\frac{1}{8}$  inch layer of mineral wool, held in place by a plate of black sheet steel bolted to the top. This prevents overheating and at the same time conserves heat. The galvanized sides are insulated by a lining of asbestos paper. Heat is furnished by an oil lamp with drawn steel reservoir 7 $\frac{1}{2}$  inches in diameter, fitted with standard No. 2 burner and 5 inch chimney of black steel. A semi-circular galvanized steel shield, extending from the top of the hover to the floor, forms a lamp shield which shuts off the lamp from the hovering space. An additional shield on the outside protects it from drafts or gusts of wind. The fumes and hot gases from the lamp are delivered directly into a hollow steel drum or radiator, 14 inches in diameter, bolted under the top, from which they pass through a vent tube into the outside air. The steel drum or radiator, warmed by the hot gases, communicates its warmth to air currents, which are deflected downward over the backs of the chicks and out through the curtain slits. The temperature is controlled by a thermo-regulator which operates a valve at the top of the air inlet and thus controls the amount of cold air admitted. Dimensions of hover: height, 12 inches; diameter, 23 inches. Shipping weight, 35 pounds; capacity, 50 to 100 chicks.

Complete with regulator, lamp and brooder thermometer . . . . . 11.00

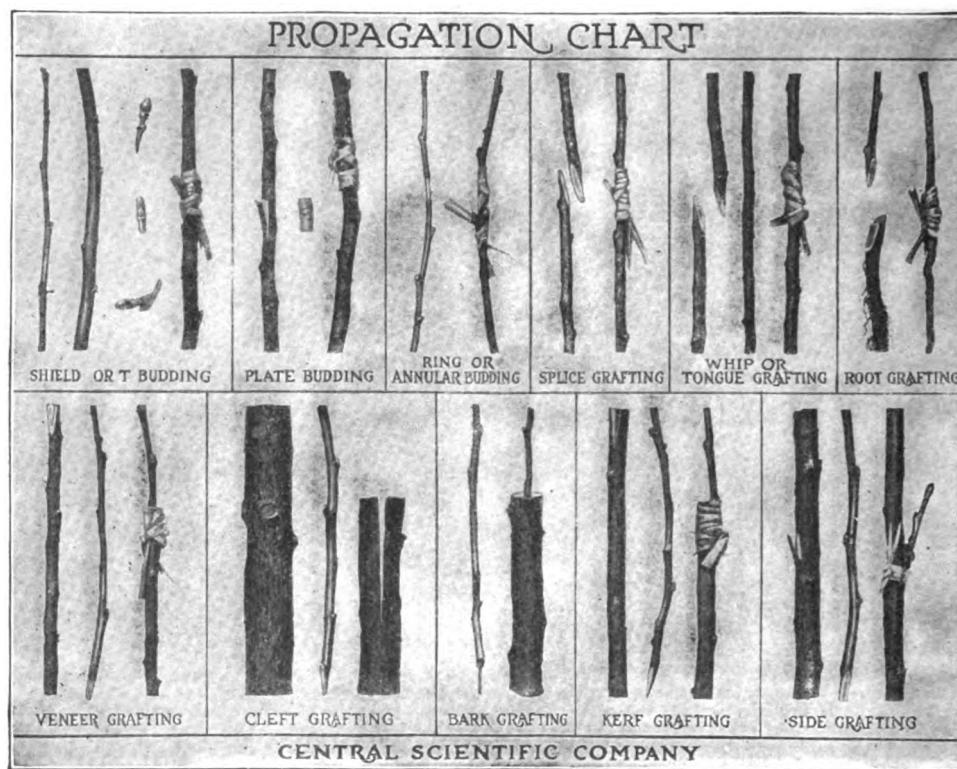
**A1430. CHICK FEEDER,** round form, made of galvanized iron. Cannot be upset, nor can chicks get into it to contaminate feed. Can be used also for water or milk. No. . . . .

A	B	
Diameter, inches . . . . .	6	8
Number of holes . . . . .	8	12
Each . . . . .	.25	.45
Per dozen . . . . .	2.40	4.20

**A1432. CHICK FOUNTAIN,** of one piece non-rusting metal. Can be screwed on the top of any Mason fruit jar. Easily cleaned and sterilized. Prevents drowning of chicks. Can be used for feed also. Without jar . . . . . Each .15

**A1436. EGG TESTER,** for use with any kerosene lamp provided with No. 2 burner.

Without lamp . . . . .	Each .30
	Per dozen 3.00



No. A1440.

**A1440. PROPAGATION CHART.** A set of miniature models of natural wood, 6 inches long, representing the better and more common forms of budding and grafting. This chart will be found of great value to anyone teaching horticulture and the propagation of plants, since the models represent the work as it is actually done in the field and are, therefore, of much more value for purposes of demonstration and explanation than ordinary illustrations and written descriptions.

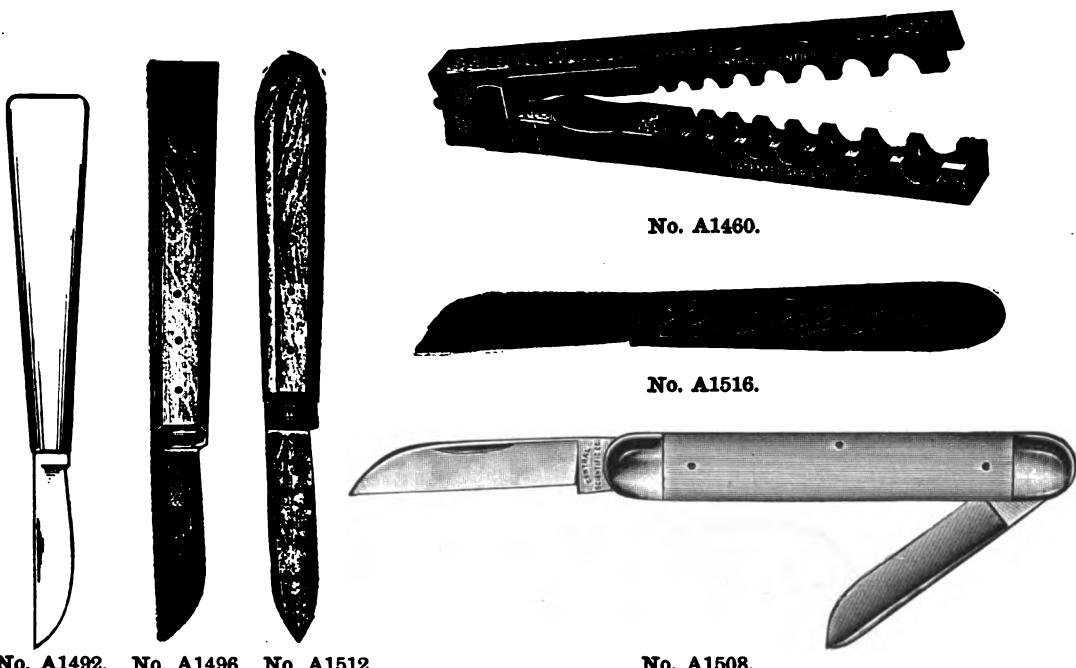
The models are mounted upon heavy cardboard, 20 x 36 inches, to which they are so securely wired by an ingenious device that there is little danger of their becoming displaced from their proper position.

The woods used in the models represent, so far as is possible, woods of the proper age to use in actual work and they appear just as they come from the orchard, except that they are coated with shellac for the purpose of preservation.

The following forms of propagation are represented:

Shield or T Budding.	Veneer Grafting.
Plate Budding.	Cleft Grafting.
Ring or Annular Budding.	Bark Grafting.
Splice Grafting.	Kerf Grafting.
Whip or Tongue Grafting.	Side Grafting.
Root Grafting.	

Brief descriptions are printed beneath each method of propagation, so that the chart is self-explanatory. For example, "Cleft Grafting, the more common form of retopping old trees or changing the variety of the fruit borne by the tree. Usually but two scions are placed in each stock."..... \$6.00



No. A1492. No. A1496. No. A1512.

No. A1508.

### PRUNING, BUDDING, GRAFTING, PROPAGATING TOOLS

**A1460. BUDDING TOOL, White's.** A Scientific Instrument designed for the propagation of trees by the Annular, Semi-Annular, Patch and Veneer Methods.

This tool has been in continual use in the largest pecan nursery and grove in the country for some years, and has received many flattering recommendations from prominent horticulturists, nurserymen and others. Seedlings from  $\frac{1}{8}$  of an inch to a trunk or branch 3 inches or over in diameter can be budded with it. The tool may be dropped, but on account of the greater weight being at the hinge, it automatically closes in falling and the hinge strikes the ground first. Thus the blades are always protected. The tool may be laid on the ground without blades coming in contact with the soil. The tool can be hung over a limb while the bud is being wrapped. It can be safely and conveniently carried in the pocket. The holes in the handles between each pair of blades admit light to see that the bud is in the center of the annular cut.

The blades are made of the finest steel and are very durable. The graduated caliper holes are of standard gages and can be used for caliperizing stock and budding wood where a close, complete, annular fit is desired.

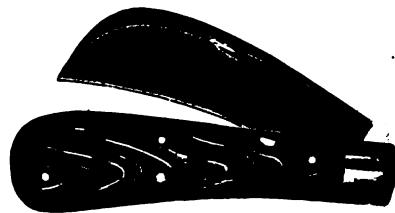
Danger of spiral cutting is minimized with this tool. The resiliency of the handles makes the tool adapt itself to any stock without regard to tapering and without cutting into sapwood on the lower cut. .... \$2.75

### GRAFTING SUPPLIES

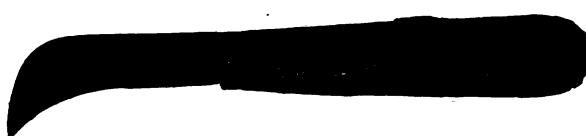
A1472. GRAFTING WAX, prepared according to formula by Prof. L. H. Bailey.....	Per pound	.60
A1474. TAPE, for binding wax to grafting wounds. In rolls of ten yards, $\frac{1}{2}$ inch wide..	Per roll	.20
A1476. RAFFIA, for grafting, long strand, first quality, natural color.....	Per $\frac{1}{2}$ lb. hank	1.25
	Per 5 lb. bundle	10.00
A1478. TWINE, 8 ply cotton, for grafting.....	Per $\frac{1}{2}$ lb. ball	.75
A1480. KNITTING COTTON, No. 18.....	Per ball	.20
A1492. BUDDING KNIFE, finest quality glazed blade, ivory handle tapered at end to form budger. This budding knife is well adapted for budding fruit trees or evergreen trees. Very high quality. Length of blade, about $2\frac{1}{2}$ inches. Length over all, about 6 inches.....		1.40
A1496. BUDDING KNIFE, finest quality glazed blade, beechwood handle, not folding. Total length, $5\frac{1}{2}$ inches .....		.40
A1508. GRAFTING AND BUDDING KNIFE, finest quality glazed blades, brass lining. German silver bolsters, ivory celluloid handle 4 inches long. Well adapted for a small fruit grower..		1.80
A1512. GRAFTING KNIFE, finest quality glazed blade, beechwood handle, not folding. A fine tool for either nursery grafting or top working of fruit trees. Total length, $6\frac{3}{4}$ inches.....		.60
A1516. GRAFTING KNIFE, finest quality glazed blade, beechwood handle, not folding. Especially adapted for top working of fruit trees. Total length, 8 inches.....		.55



No. A1524.



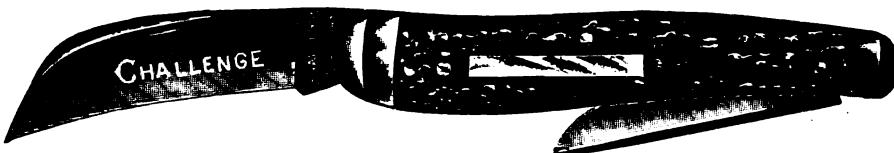
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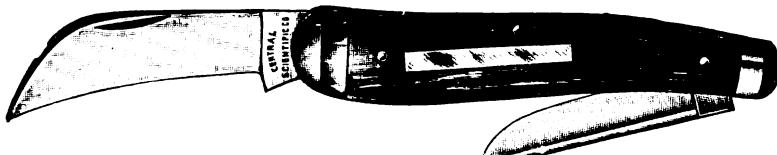
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No. A1540.

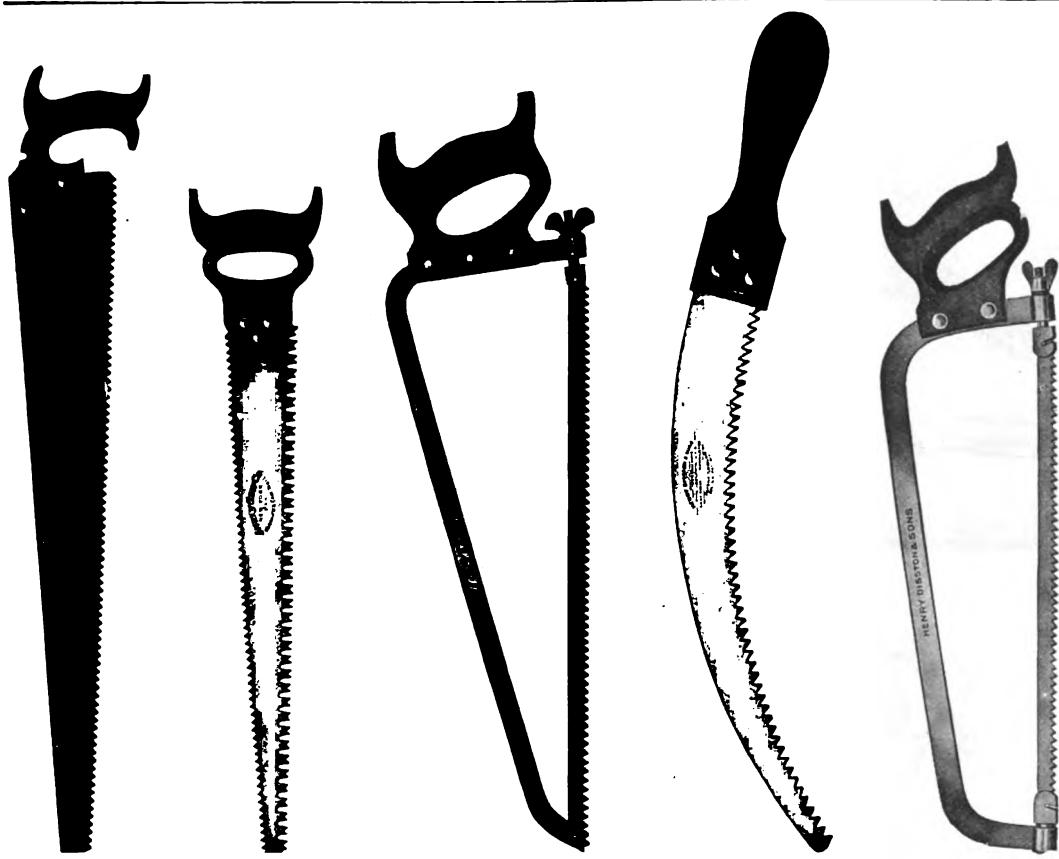


No. 8150.



No. A1556.

A1524. <b>PROPAGATING KNIFE</b> , finest quality glazed blade, brass lining, black handle 4 inches long. Well adapted for marking, cutting, and grafting work .....	\$0.80
8148. <b>PRUNING KNIFE</b> , one blade, good quality steel, iron lined, cocoa handle 4 inches long. This knife is especially good for training young trees and cutting off water sprouts.....	1.10
A1536. <b>PRUNING KNIFE</b> , finest quality glazed blade, beechwood handle, not folding. Well adapted for nursery pruning and training young trees. Total length, 8 inches.....	.75
8150. <b>PRUNING AND BUDDING KNIFE</b> , two blades, iron lined, stag handle. This knife is well adapted for both nurseryman and orchardist. 4 inches long .....	2.25
A1556. <b>PRUNING AND BUDDING KNIFE</b> , finest quality glazed blades, brass lining, German silver bolsters, stag handle 4 inches long. A high class knife for nursery and orchard work..	1.30



No. A1580.

No. A1584.

No. A1588.

No. A1592.

No. A1596.

A1580. PRUNING SAW, crucible steel, grained blade, apple handle, polished edge, three screws. This saw is well adapted for making large cuts on either shade or fruit trees. There is no danger of injury by bruising the bark on the remaining branch by using this saw. The teeth can be set so that this saw will cut either green or dead wood. 20 inches long..... \$1.90

A1584. PRUNING SAW for shade trees, double edge, beech handle, three screws. One edge is designed for cutting off live or green wood branches and the other edge for removing dead branches. 18 inches long..... 1.20

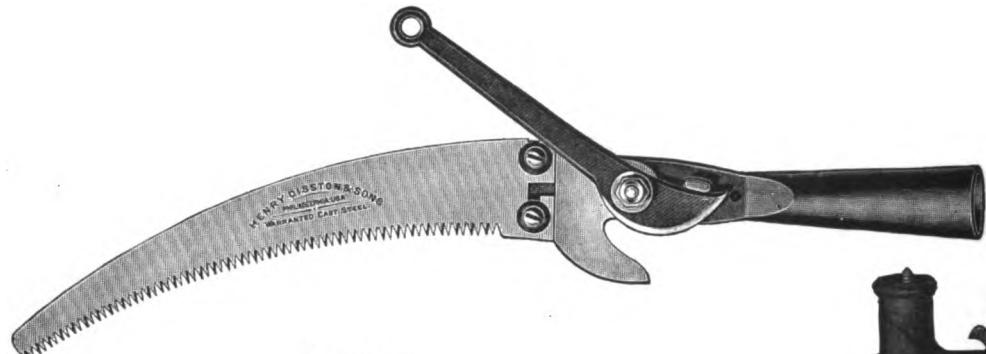
A1588. PRUNING SAW, flat steel back, narrow tapered joint, extra large handle for use with gloved hand, blued steel blade. This saw is designed for making clean close cuts in tight places, such as cutting out branches in crotches of fruit trees. 18½ inches long..... 2.20

A1589. EXTRA BLADES for No. A1588 Pruning Saw..... Each .30

A1592. PRUNING SAW, crescent shape, crucible steel blade, beech handle, three screws. This is a draw cut saw and can be used to good advantage in cutting back branches in the tops of fruit trees. In cutting back, care should be taken to cut to a branch about the size of the one taken off. 12 inches long..... 1.20

A1596. PRUNING SAW, Pacific Coast, crucible steel blade. Every orchardist should have one or more of these swivel bladed saws. Any cut that can be made with a key-hole saw in pruning work can be made with this saw and also many cuts where a mallet and chisel are ordinarily used. This saw enables the pruner to make all cuts close to and parallel with the remaining branch. This make of saw is used by nearly all of the leading orchardists throughout the country. A dull saw blade can instantly be changed for a sharp one, thus allowing the pruner to do good and fast work. The swivel blade can be turned at any angle so that it is possible to make with ease cuts which otherwise would be difficult to make. 14 inches long..... 2.30

A1597. EXTRA BLADES for No. A1596 Pruning Saw ..... Each .25



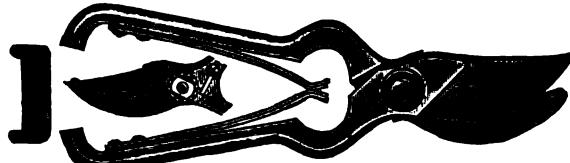
No. A1604.



No. A1620.



No. A1624.



No. A1628.



No. A1608.

**A1604. PRUNING HOOK AND SAW** with knife and blade of crucible steel. Although possessing great strength, it is of light construction and can be used with or without a pole. The crescent shape blade has long, slender teeth so formed as to draw the saw into the wood. The saw blade is removable and is 10 inches long. This tool without the pole is well adapted for orchard pruning work and with the pole it can be used for training shade trees and cutting out blight in fruit trees during the summer. All dormant or summer orchard pruning work, with the exception of cutting out blight appearing on small branches, should be done near at hand in order to avoid stubs and the splitting down of branches, etc. Without pole... \$3.20

**A1608. PRUNING SAW AND KNIFE**, high grade steel chisel and saw blade, japanned frame. Saw cuts both ways, insuring smooth and rapid execution and preventing binding in cutting green wood. Length of saw, 10 inches. This tool is well adapted for working in shade trees. Without pole ..... 2.20

**A1620. PRUNING SHEARS, California Pattern**, hand forged, polished tool steel blade, lock nut, volute spring, malleable iron handle. These shears allow the pruner to make an upward close cut, thus making a wound which will soon heal over. Well adapted for vineyard or home orchard pruning. 9 inches long ..... 1.10

**A1624. PRUNING SHEARS, California Pattern**, hand forged tool steel blade, full polished, lock nut, regulating ratchet, double brass spring. Many pruners prefer the double brass spring on account of the ease of operating. These shears are well adapted for regular orchard pruning and will give good service. 9 inches long ..... 2.20

**A1628. PRUNING SHEARS, California Pattern**, fully polished, double brass spring, adjustable lock nut. Each shear is supplied with one extra blade. A low priced tool very suitable for heavy work. 9 inches long ..... 3.00



No. A1656.

No. A1636.

No. A1648.

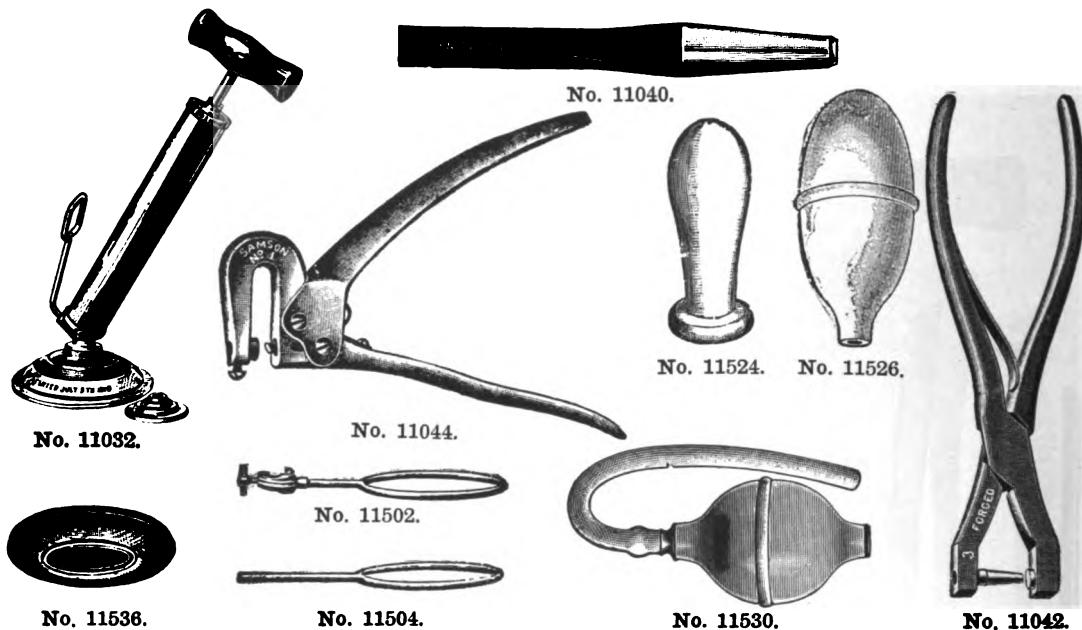
**A1636. PRUNING SHEARS, Henry's Pattern**, good quality steel blade, tempered and polished, with brace at back, black japanned handle, volute spring. These shears are well adapted for grape pruning and where light pruning is desired on small shrubs and trees. 8½ inches long \$0.70

**A1648. PRUNING SHEARS, California Pattern**, long handle, blade forged from high grade steel. Many cuts which could be made with a saw can be made with these shears, thus saving time. This is a tool which every orchardist should own, as it will enable him to do quick and effective work. Length, 26 inches..... 3.80

**A1656. TREE PRUNER, Henry's.** The blade cuts from the top and from the moment the cut is started the weight of the branch opens the gap, preventing the knife from binding. This tool is designed for training shade trees and cutting out blight on small branches in fruit trees. Prices include pole.

No. ....	A	B
Length, feet .....	6	10
Each .....	1.90	2.00

**A1657. EXTRA KNIFE** for No. A1656. Will fit either length ..... .30



11032. **PUMP, Little Giant Lift and Force**, for keeping the laboratory plumbing clean. Will clean and open any clogged waste pipe without removing connections. Works by vacuum and pressure, and will break up any solid waste or obstruction caused by chemical action in a few minutes. The pump is made of heavy brass with attachments of pure rubber. The cup is of steel, is non-collapsible and is of sufficient size to permit its use over 4-inch screen drains. An adjustable washer is furnished for use where the other cup will not fit..... \$7.00

11040. **PUNCHES**, hollow cast steel.  
Hole diameter, inches.....  $\frac{1}{8}$   $\frac{1}{4}$   $\frac{3}{8}$   $\frac{1}{2}$   
Each ..... .25 .50 .75 1.00

11042. **PUNCH**, spring, cast steel, double joint; for leather, etc. Length,  $7\frac{1}{4}$  inches..... .60

11044. **PUNCH, Paper, Samson**. The most powerful hand punch made; will perforate anything from a thin sheet of steel to  $\frac{1}{4}$ -inch paper. Nickel-plated and fitted with  $\frac{3}{16}$ -inch die..... 3.00

11502. **RINGS, Iron**, for attaching to retort stands; with  $\frac{5}{16}$ -inch screw. Distance from rod to center of rings,  $4\frac{1}{2}$  inches.  
Outside diameter, inches..... 2 3 4 5 6 7  
Inside diameter, inches.....  $1\frac{5}{16}$   $2\frac{5}{16}$   $3\frac{3}{8}$   $4\frac{5}{16}$   $5\frac{1}{4}$  6  
Each ..... .25 .27 .30 .33 .36 .40

11504. **RINGS, Iron, Extension**, for fastening to retort stand by means of Clamp Holders Nos. 2914 and 2916. Length of rod,  $7\frac{1}{2}$  inches.  
Outside diameter, inches..... 3 4 5 6 7  
Each ..... .12 .15 .18 .25 .30

**RING STANDS**, see **Supports**.

11512. **ROPE, Manila**, good quality,  $\frac{3}{8}$ -inch diameter. (No order taken for less than 12 ft.) Per foot .04

11520. **RUBBER BANDS**, assorted, in  $\frac{1}{4}$  pound boxes..... Per box 1.00

11524. **RUBBER BULBS**, for dropping pipettes, etc.  
Capacity, cc..... 2 5  
Each ..... .03 .10

11526. **RUBBER BULBS**, large size, heavy walled, for pipettes, etc.  
Capacity, cc..... 25 50  
Length, inches..... 3  $3\frac{1}{2}$   
Diameter, inches.....  $1\frac{1}{2}$  2  
Each ..... .15 .25

11530. **RUBBER BULB**, with hard rubber valves, for pressure only, with connecting tube. Capacity about 50 cc..... .35

**RUBBER BULB EXPANDER**, see No. 11630.

11536. **RUBBER CAPS**, flat shape, for test tubes of same diameter as caps.  
Diameter, inches.....  $\frac{1}{2}$   $\frac{5}{8}$   $\frac{3}{4}$  1  
Per dozen..... 1.00 1.05 1.10 1.20

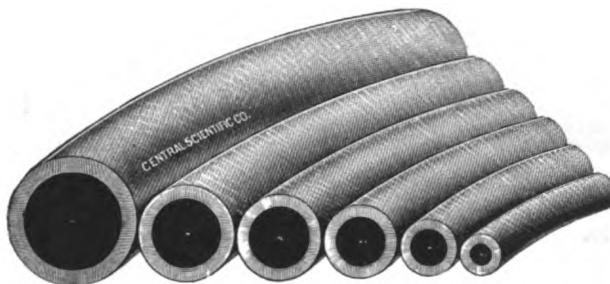
11544. **RUBBER DAM**, pure gum..... Per square foot .30

11546. **RUBBER DAM**, pure gum, 36 inches wide..... Per linear foot 1.10

**RUBBER FINGER COTS**, see **Finger Cots, Rubber** No. 5514.

**RUBBER GLOVES**, see **Gloves**.

11566. **RUBBER SHEETING**, white, 36 inches wide..... Per yard 1.40



11572. **RUBBER STOPPERS**, made from best quality of rubber especially for chemical laboratory use; will not harden from age. Each size furnished in three styles—solid, one hole or two holes. .... Per pound \$1.80

**Table Showing Approximate Number of Rubber Stoppers in One Pound.**

Number .....	00	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Diameter large end, mm.....	14	17	18	20	23	25	27	32	37	41	45	50	56	63	68
Diameter small end, mm.....	9	12	15	16	18	20	23	26	30	33	37	42	48	53	61
Approximate Number in One Pound	{ Solid .....	120	80	60	55	42	33	28	20	15	12	11	8	6	5
	1 hole .....	130	90	65	60	45	35	30	21	16	13	11	8	6	5
	2 hole .....	138	94	70	64	47	38	32	22	17	14	12	8	6	5

#### RUBBER TUBING, ALL KINDS.

**Special Notice.** Rubber Tubing of the various kinds listed comes in original 12 foot lengths from the manufacturer, and is sold only in lengths of 3 feet or multiples of 3. This enables us to avoid the waste due to short pieces of unsalable lengths and permits us to sell the tubing to our customers at a reasonable price, without the necessity of a charge to cover the loss.

11580. **RUBBER TUBING**, White, light wall, cloth impression. This tubing is recommended for general laboratory use where an inexpensive tubing is desired.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$
Per foot (see Special Notice).....	.05	.07	.10	.12	.14	.24

11582. **RUBBER TUBING**, White, heavy wall, same quality as No. 11580. The  $\frac{1}{4}$  inch size is the standard size and quality for Bunsen burner connections.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$
Per foot (see Special Notice).....	.13	.14	.20	.26	.36	

11588. **RUBBER TUBING**, Red, Antimony, light wall. Retains its elasticity longer than No. 11580 and is preferred by many users for this reason.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$
Per foot (see Special Notice).....	.06	.09	.12	.15	.21	.35

11590. **RUBBER TUBING**, Red, Antimony, heavy wall, same quality as No. 11588. Preferred by many users for Bunsen burner tubing in place of No. 11582.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{5}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{5}{64}$
Per foot (see Special Notice).....	.18	.22	.27	.36	.54	

11594. **RUBBER TUBING**, Black, pure gum, light wall, seamless. This tubing will not bloom and is especially suited for gas analysis work.

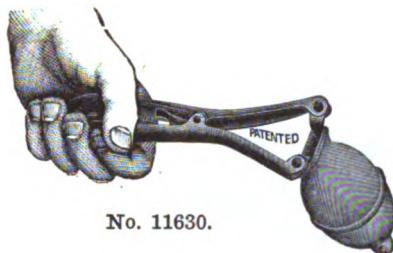
Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{3}{64}$	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{64}$
Per foot (see Special Notice).....	.08	.10	.15	.17	.30	.45

11596. **RUBBER TUBING**, Black, pure gum, heavy wall, same quality as No. 11594.

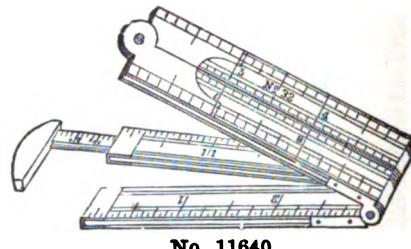
Diameter inside, inches.....	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{5}{64}$	$\frac{5}{64}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{7}{64}$	$\frac{1}{8}$
Per foot (see Special Notice).....	.15	.17	.22	.27	.42	.60

11610. **RUBBER TUBING**, Pressure, Black, semi-pure gum, extra heavy wall, for filter and air pump connections, vacuum work, etc. Because of its flexibility this tubing is also useful for connections to mercury leveling bulbs, nitrometers, etc.

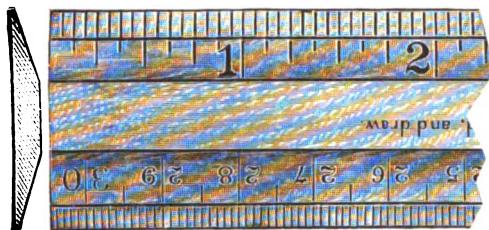
Diameter inside, inches.....	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Thickness of wall, inches.....	$\frac{5}{64}$	$\frac{5}{64}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{7}{64}$	$\frac{1}{8}$
Per foot (see Special Notice).....	.50	.50	.60	.60		



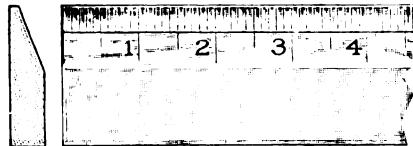
No. 11630.



No. 11640.



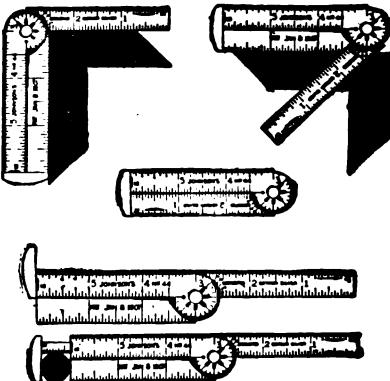
No. F727.



No. F729.



No. 11642.



No. 11646 (five positions).

11614. **RUBBER TUBING, Pressure, cloth insertion, heavy wall, for air pump connections, etc.**  
 Diameter inside, inches.....  $\frac{3}{16}$   $\frac{1}{4}$   $\frac{5}{16}$   $\frac{3}{8}$   $\frac{1}{2}$   
 Per foot (see Special Notice)..... \$0.12 .15 .16 .18 .22

11624. **TUBING, Flexible, Steel, with rubber packing, for connections to Bunsen burners, hot plates, etc.** It is indestructible except by acids and excess of oil, is gas tight and safe from kinking or breaking. Each length is furnished with heavy rubber socket at each end. Inside diameter,  $\frac{1}{4}$  inch.  
 Length, inches ..... 24 36  
 Each ..... .25 .35

11630. **RUBBER TUBE and Bulb Expander,** for stretching tubing and bulbs to facilitate attaching to connection tubes, pipettes, etc..... .80

F661. **RULE, Celluloid,** metric and English, 6 inches long. Of white celluloid with one edge graduated in mm, other edge in eighths of inches. The two scales are numbered from the same end of the rule, making easy a comparison of measurements in the two systems. This scale may easily be carried in the vest pocket..... Each .06  
 Per hundred 5.00

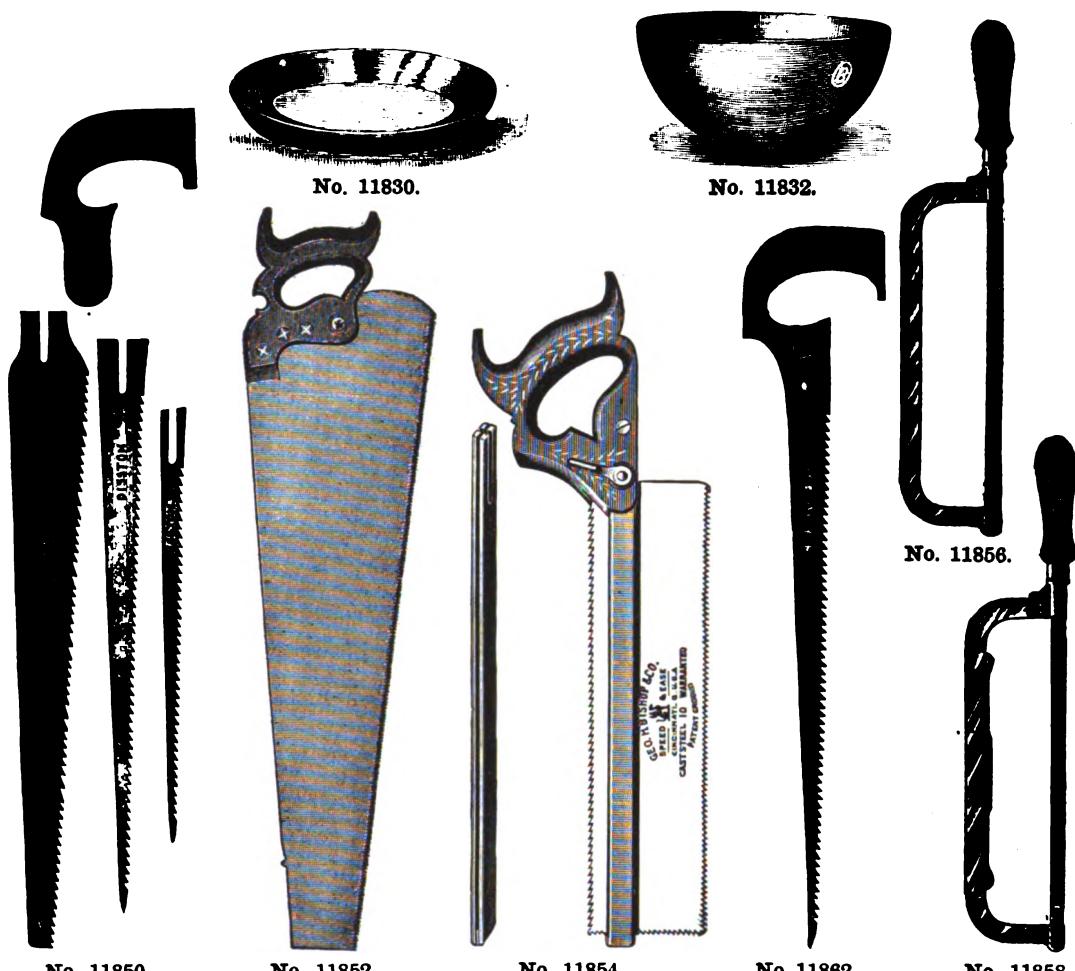
11640. **RULE, English and Metric,** boxwood, 12 inches by 16ths on one side, millimeters on the other. Four fold, solid brass joints, with brass caliper extension for measuring diameters up to  $2\frac{3}{4}$  inches or 70 mm. Made to carry in pocket..... .75

11642. **RULE, English and Metric,** light boxwood, 36 inches by 16ths on one side, millimeters on the other. Six fold, spring joints, very convenient for comparing English and metric measurements. Made to carry in pocket..... .50

11646. **RULE, Johnson's Patent Combination.** This six-inch folding pocket rule is made of spring German silver accurately and distinctly graduated; it can be used as a Hook-rule, Caliper-gage, Protractor, Triangle or Try-square. The upper edge is graduated in 32nds, the lower edge in 16ths. The caliper blade is graduated in 16ths on one side and 32nds on the other. The protractor is graduated every five degrees and is provided with a vernier reading to  $\frac{1}{2}$  degree. This handy and indispensable rule can be set to any desired angle, and the center joint is so constructed that the rule remains firm wherever set ..... 2.50

F727. **RULE, Maple,** metric and English, 12 inches long, one face graduated on one edge in millimeters and on the other in inches and 16ths. Double beveled with protractor (5 degree divisions) on back ..... Each .06  
 Per dozen .60

F729. **RULE, Boxwood,** metric and English, 12 inches long. One edge beveled and accurately graduated in millimeters, the other face graduated in inches and 16ths..... Each .20  
 Per dozen 2.00



11830. <b>SAND BATHES</b> , cold rolled steel, shallow form.							
Diameter, inches.....	3	4	5	6	8	10	
Each .....	\$0.10	.12	.15	.20	.35	.65	
11832. <b>SAND BATHES</b> , cold rolled steel, hemispherical form.							
Diameter, inches.....	3	4	5	6	8	10	
Each .....	.15	.20	.25	.30	.45	.75	
11850. <b>SAW</b> , Combination. Wood handle, with polished brass adjusting lever and set of three interchangeable blades, including a 10-inch keyhole blade and a 14-inch compass blade.....							1.70
11852. <b>SAWS</b> , Cross-cut, good grade steel, filed ready for use.							
Length, inches.....	20	26					
Each .....	1.50	2.00					
11854. <b>SAW</b> , Dovetailing and Depth Cutting, one side for cross, the other for rip sawing. The back of this saw constitutes a slot through which the blade slides, enabling the workman to move, space and adjust it to any desired width or distance from edge of back, so as to cut exactly any desired depth. Length of blade, 18 inches.....							3.75
11856. <b>SAW</b> , Hack, for cutting metals. Solid steel frame, natural finish, enamel handle; blade can be faced four ways. With one blade.....							1.00
11858. <b>SAW</b> , Hack, of steel, white nickel-plated, except the handle. Adjustable for 8 to 12-inch blades; blades can be faced four ways. With one blade .....							2.00
11859. <b>HACK SAW BLADES</b> , high grade steel.							
Length, inches.....	8	12					
Per dozen .....	1.00	1.30					
11862. <b>SAW</b> , Keyhole. Wood handle with 10 inch blade .....							.70
<b>SAW</b> , Keyhole, see No. 11850 Combination Saw.							
11864. <b>SAW</b> , Rip, good grade steel, filed ready for use; length, 28 inches.....							2.25



No. 11882.



No. 11904.



No. 11908.



No. 11918.

11874. **SCALE (METER STICK), Maple**, 2 cm square. One face is plain and shows the length of the simple meter; the second face is graduated in tenths of meters, or decimeters; the third face is graduated in hundredths of meters, or centimeters; and the fourth face is graduated in thousandths of meters, or millimeters. The last named face gives divisions also in decimeters and centimeters. This piece is valuable in teaching students the metric system of lengths.. \$0.80

11876. **SCALE (METER STICK), Boxwood**. A high-grade stick graduated in millimeters on both edges of one face; other face blank..... .80

11878. **SCALE (METER STICK), Boxwood**. Same as No. 11876, but graduated in millimeters and inches .. .80

11882. **SCALE (METER STICK), Maple**. Both edges of one face are graduated in decimeters, centimeters and millimeters; one edge of the other face in inches and eighths..... .30

11884. **SCALE (HALF-METER STICK), Maple**. Same graduation as No. 11882..... .20

11888. **SCALE (METER STICK), Maple**. Same as No. 11882, but ends tipped with brass..... .45

11890. **SCALE (HALF-METER STICK), Maple**. Same as No. 11884, but ends tipped with brass .40

11892. **SCALE (DOUBLE-METER STICK), Maple**, ends tipped with brass. Same as No. 11888, but two meters long..... .15

11904. **SCOOP, Agateware**, 3x5½ inches, with handle ..... .39

11908. **SCOOPS, Horn**, flat and wide, with square ends, for ordinary use.  
Length, cm..... 10 12 14 16  
Each ..... .16 .20 .27 .35

11918. **SCOOP, Tin Plate**, with handle, for mixing. Length of bowl, 8 inches; width, 5¼ inches .45

**SCREWS, Machine, Iron, Flat Head.** In gross packages only.

	Length, inches	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/2
11940A.	No. 2, per gross...	.22	.22	.22	.22	.25	.26	.28			
11940B.	No. 4, per gross...	.22	.22	.22	.22	.25	.26	.28	.30		
11940C.	No. 6, per gross...	.25	.25	.25	.25	.27	.29	.32	.35	.40	.50
11940D.	No. 8, per gross...	.27	.27	.30	.30	.35	.36	.40	.42	.45	.60
11940E.	No. 10, per gross...	.42	.45	.45	.50	.52	.55	.57	.60		.90

11942A-E. **SCREWS, Machine, Iron, Round Head.** Same sizes and prices as No. 11940. In gross packages only.

**SCREWS, Machine, Brass, Flat Head.** In gross packages only.

	Length, inches	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/2
11944A.	No. 2, per gross...	.30	.30	.33	.35	.40	.45				
11944B.	No. 4, per gross...	.35	.35	.36	.40	.45	.50	.55			
11944C.	No. 6, per gross...	.45	.45	.47	.50	.55	.65	.75	.80	.90	1.45
11944D.	No. 8, per gross...	.65	.65	.75	.80	.85	.90	1.05	1.15	1.25	1.80
11944E.	No. 10, per gross...	.65	.65	1.00	1.05	1.20	1.40	1.65	1.80	1.95	2.55

11946A-E. **SCREWS, Machine, Brass, Round Head.** Same sizes and prices as No. 11944. In gross packages only.

**SCREWS, Wood, Iron, Flat Head.** In gross packages only.

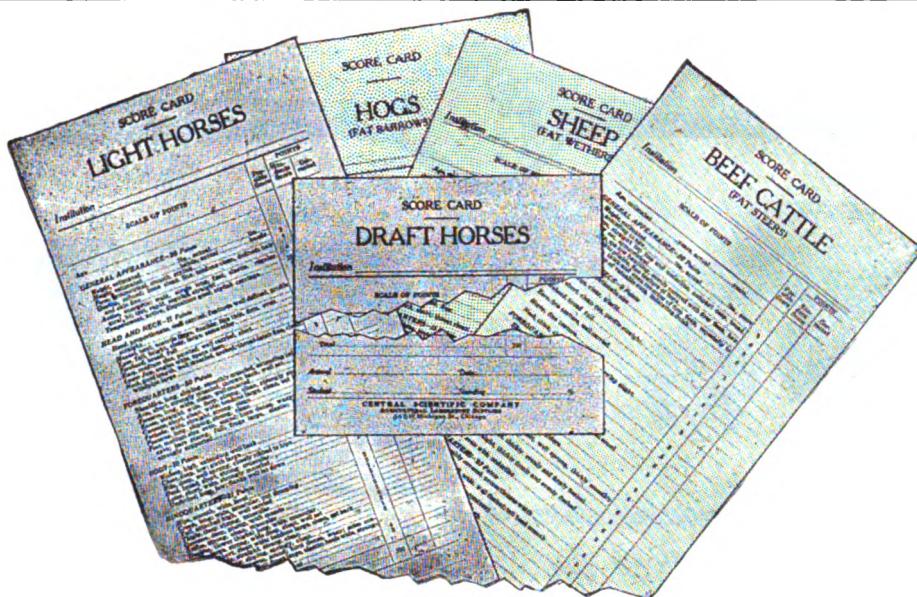
	Length, inches	3/8	1/2	5/8	3/4	7/8	1
11950A.	No. 2, per gross.....		.40	.40	.40		
11950B.	No. 4, per gross.....		.40	.40	.40	.45	.45
11950C.	No. 6, per gross.....		.40	.40	.45	.45	.45
11950D.	No. 8, per gross.....		.45	.45	.50	.50	.55
11950E.	No. 10, per gross.....		.55	.55	.55	.60	.60

11952A-E. **SCREWS, Wood, Iron, Round Head.** Same sizes as No. 11950. Prices 0.10 per gross greater. In gross packages only.

**SCREWS, Wood, Brass, Flat Head.** In gross packages only.

	Length, inches	3/8	1/2	5/8	3/4	7/8	1
11954A.	No. 2, per gross.....		.85	.90	.95	1.05	1.30
11954B.	No. 4, per gross.....		1.00	1.00	1.10	1.20	1.45
11954C.	No. 6, per gross.....		1.15	1.20	1.35	1.45	1.55
11954D.	No. 8, per gross.....		1.40	1.55	1.70	1.85	2.05
11954E.	No. 10, per gross.....			2.00	2.25	2.45	2.70

11956A-E. **SCREWS, Wood, Brass, Round Head.** Same sizes and prices as No. 11954. In gross packages only.



No. A1800.

A1800. SCORE CARDS, Farm Animals, in tablets of 50 sheets.

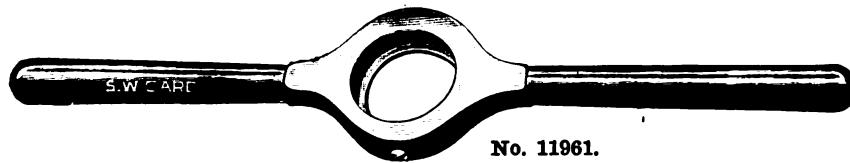
No. ....	A	B	C	D
Type .....	Beef Cattle.	Dairy Cattle.	Bacon Hogs.	Fat or Lard Hogs.
Per tablet .	.25	.25	.25	.25
No. ....	E	F	G	H
Type .....	Draft Horses.	Light Horses.	Draft Mules.	Mutton Sheep.
Per tablet .	.25	.25	.25	.25
			J	Wool Sheep.



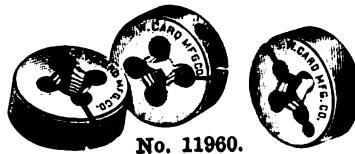
Nos. A1804—A1820.

A1804. SCORE CARDS, Cotton, in tablet of 50 sheets .....	Per tablet	.25
A1808. SCORE CARDS, Eggs, in tablet of 50 sheets.....	Per tablet	.25
A1812. SCORE CARDS, Flax Seed, in tablet of 50 sheets .....	Per tablet	.25
A1816. SCORE CARDS, Fruit, in tablet of 50 sheets.....	Per tablet	.25
A1820. SCORE CARDS, Grain, in tablets of 50 sheets,		.25

No. ....	A	B	C	D
Type .....	Barley.	Corn.	Oats.	Wheat.
Per tablet .	.25	.25	.25	.25
A1824. SCORE CARDS, Market Cream, in tablet of 50 sheets.....	Per tablet	.25		
A1828. SCORE CARDS, Potatoes, in tablet of 50 sheets .....	Per tablet	.25		
A1832. SCORE CARDS, Poultry, in tablet of 50 sheets .....	Per tablet	.25		



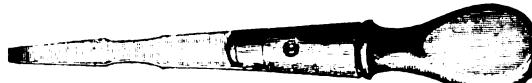
No. 11961.



No. 11960.



No. 11970.



No. 11978.



No. 11980.

11960. **SCREW DIES**, round, adjustable,  $\frac{5}{8}$  inch diameter,  $\frac{1}{4}$  inch thick.

No. ....	A	B	C	D	E	F	G	H	J
Screw gage No....	2	4	6	6	8	8	10	12	14
Approx. diam., in..	$\frac{5}{64}$	$\frac{7}{64}$	$\frac{9}{64}$	$\frac{9}{64}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{4}$
No. threads to inch..	.56	.36	.32	.40	.32	.40	.32	.24	.20
Each .....	\$0.95	.80	.60	.60	.60	.60	.60	.60	.60

11961. **SCREW DIE STOCK**, for holding No. 11960 Dies ..... .80

11964. **SCREW DIES**, round, adjustable.

No. ....	A	B	C	D
Diameter of die, inches.....	1	1	$1\frac{5}{16}$	$2\frac{1}{4}$
Diameter of screw, inches.....	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
No. threads to inch.....	20	16	12	10
Each .....	1.10	1.10	1.50	3.00

11965. **SCREW DIE STOCK**, for holding No. 11964 Dies.

No. ....	A	B	C
For die of diameter, inches.....	1	$1\frac{5}{16}$	$2\frac{1}{4}$
Each .....	1.80	2.25	3.30

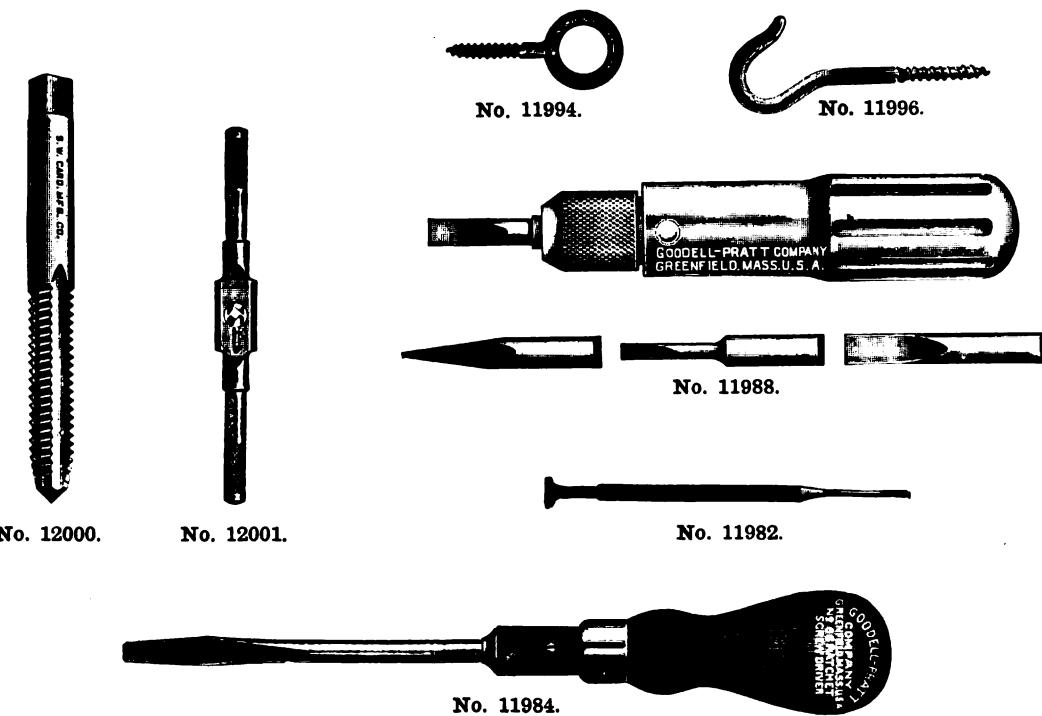
11968. **SCREW DIE AND TAP SET**, with stock 7 inches long, tap wrench  $7\frac{1}{2}$  inches long, 6 dies  $1\frac{3}{16}$  inch diameter and 6 taps cutting threads 4-36, 6-32, 8-32, 10-24, 12-24 and 14-20. Set is enclosed in neat hardwood case..... 9.00

11970. **SCREW DIE AND TAP SET**, with stock 9 inches long, 5 dies 1 inch in diameter, and 5 taps cutting threads  $\frac{1}{4}$ -20,  $\frac{5}{16}$ -18,  $\frac{3}{8}$ -16,  $\frac{1}{16}$ -14 and  $\frac{1}{2}$ -12. Set is enclosed in neat hardwood case..... 12.50

11978. **SCREW DRIVERS**, with steel blade in wooden handle.

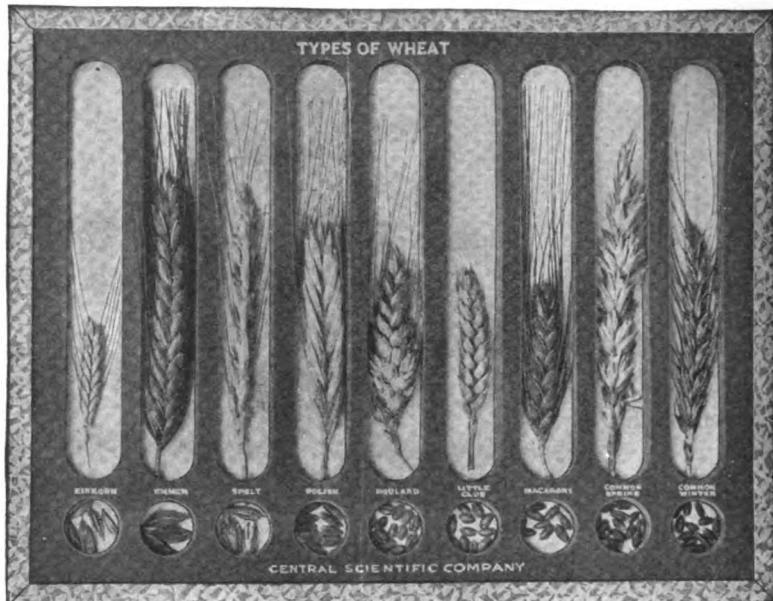
Length, inches .....	4	8
Each .....	.20	.40

11980. **SCREW DRIVER**, rosewood handle and finest steel blade, elegantly polished throughout. Especially adapted for instrument use. Indispensable to the laboratory. Length over all,  $5\frac{1}{2}$  inches; length of blade, 2 inches; width of blade,  $\frac{1}{8}$  inch..... .40



11982.	<b>SCREW DRIVER, Jewelers'</b> , of steel, nickel-plated, with blade $\frac{1}{16}$ inch in width. Length over all, $3\frac{1}{4}$ inches .....	\$0.25
11984.	<b>SCREW DRIVER, Ratchet</b> , a high grade tool. Blade and ratchet mechanism made of oil tempered tool steel; changes from right to left are made by turning the knurled ferrule. Length of blade, 6 inches; width of blade, $\frac{1}{4}$ inch.....	1.30
11988.	<b>SCREW DRIVER POCKET SET</b> , with 3 blades of assorted sizes and 1 reamer for making or enlarging holes. When not in use the blades are kept in the hollow handle. $3\frac{1}{4}$ inches long when closed; polished and nickel-plated.....	1.00
11994.	<b>SCREW EYES</b> , of bright wire.	
	No. ....	214
	Length, approx., inches.....	$\frac{3}{4}$
	Per dozen .....	.07
11996.	<b>SCREW HOOKS</b> , of bright wire.	
	No. ....	12
	Length over all, approx., inches.....	$1\frac{1}{2}$
	Per dozen .....	.15
12000.	<b>SCREW TAPS</b> , standard.	
	No. ....	A      B      C      D      E      F      G      H      J
	Screw gage No.....	2      4      6      6      8      8      10     12     14
	Approx. diam., inches.....	$\frac{5}{64}$ $\frac{7}{64}$ $\frac{9}{64}$ $\frac{11}{64}$ $\frac{13}{64}$ $\frac{15}{64}$ $\frac{17}{64}$ $\frac{19}{64}$ $\frac{1}{4}$
	No. threads to inch.....	56     36     32     40     32     40     32     24     20
	Each .....	.35    .30    .26    .26    .26    .26    .30    .30    .45
	No. ....	K      L      M      N
	Diameter, inches .....	$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$
	No. threads to inch.....	20     16     12     10
	Each .....	.45    .55    .70    1.20
12001.	<b>SCREW TAP WRENCH</b> , for taps $\frac{1}{4}$ -inch and smaller .....	2.25
12002.	<b>SCREW TAP WRENCH</b> , for taps $\frac{1}{4}$ to $\frac{3}{4}$ -inch .....	4.00

## SEED AND GRAIN SPECIMENS FARM CROPS LABORATORY MATERIAL



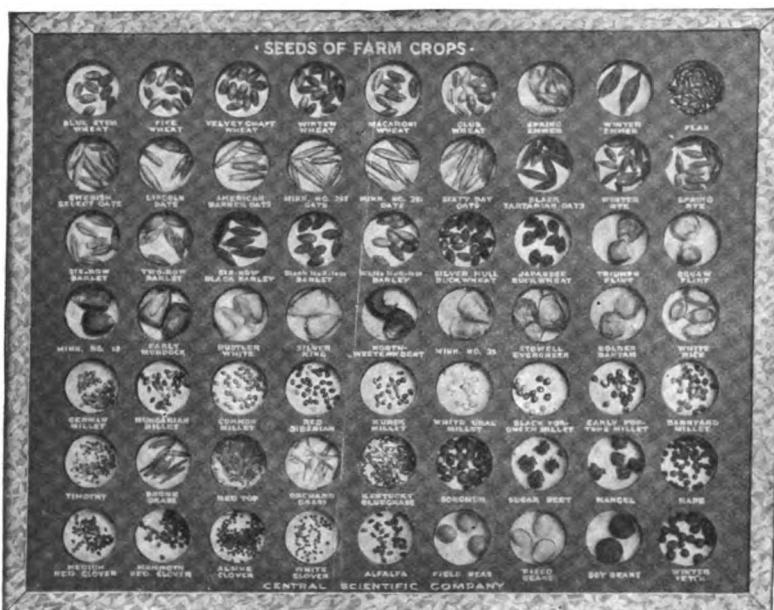
No. A1964.

With a view to overcoming the difficulty in securing and keeping properly named specimens of common farm crops, yet retaining much of the instructional value of the use of entire specimens, specialists in Farm Crops have prepared mounted collections of crops which are listed below. In addition to the mounted sets, we are prepared to supply bulk laboratory material put up with the same care as to identity of the material. This includes Ear Corn, Wheat, Barley, etc., both in the unthreshed and threshed grain, and a considerable number of Grasses, Legumes and Miscellaneous Farm Crops.

### SEED COLLECTIONS

The collections listed below are put up in neat and substantial cases. Heavy cardboard of the proper thickness is punched to receive the material, which is held in place by a back of heavy cardboard and a front of 8x10 photo glass or pyralin. Each mount is bound firmly by a specially made and suitably finished metal frame. On the back of each mount is printed data regarding the classification and characteristics of the crops or materials. From the material included in the case and the information on the back, very valuable knowledge may be secured regarding the crops being studied.

A1900. <b>TYPES OF BARLEY.</b>	Spikes and threshed seeds of Six-Row and Two-Row Barley, including Hulled, Hull-less, Bearded and Hooded types of the different colors of spikes and seeds.	\$2.10
A1904. <b>TYPICAL KERNELS AND PARTS OF EARS OF CORN.</b>	Consists of typical kernels and parts of ears mounted in a neat metal-bound glass-covered 8 x 10 inch case, illustrating points which are necessary to know in order to properly judge or grade corn. Good as well as faulty specimens are included. Depth of Kernel, Space at Cob, Chaffiness, Starchiness, Plump Tips, Adherence of Chaff to Kernels, Color of Embryo, Size of Germs, Mouldiness, Blistering, Purity, Uniformity, Shape of Kernels, Character of Dent, etc., are shown and preserved for use indefinitely. Very valuable in connection with the study of corn .....	7.70
A1908. <b>TYPES OF NORTHERN GRASSES.</b>	Inflorescence and threshed seeds of nine Grasses grown in the Northern United States.....	2.10
A1910. <b>TYPES OF SEEDS OF GRASS PLANTS.</b>	Seeds only of sixty-three crops belonging to the Grass Family, grown in the different countries of the world. A very valuable collection.	2.60
A1914. <b>TYPES OF SEEDS OF LEGUMINOUS PLANTS.</b>	Seeds of sixty-three Leguminous Crops grown in different countries of the world. A very valuable collection.....	2.60
A1916. <b>TYPES OF NORTHERN LEGUMES.</b>	Inflorescence and threshed seeds of nine Leguminous Crops grown in the Northern United States .....	2.10
A1918. <b>COWPEA TYPES AND VARIETIES.</b>	Seeds only of twenty-four varieties.....	2.10
A1920. <b>FIELD BEAN TYPES AND VARIETIES.</b>	Seeds only of twenty-four varieties of Field Beans grown chiefly in the Northern and Western United States.....	2.10
A1922. <b>FIELD PEA TYPES AND VARIETIES.</b>	Seeds only of twenty-four varieties of Field Peas	2.10
A1924. <b>SOYBEAN TYPES AND VARIETIES.</b>	Seeds only of twenty-four varieties of Soybeans..	2.10
A1926. <b>SOYBEAN TYPES AND VARIETIES.</b>	Seeds only of twenty-four varieties in addition to those shown in No. A1924.....	2.10



No. A1980.

A1930. <b>TYPES OF MILLET.</b>	Inflorescence and seeds of nine types of Millet.....	\$2.10
A1936. <b>TYPES AND VARIETIES OF OATS.</b>	Twenty-four samples of threshed grain are shown and discussed, including Hull-less Oats, several of Sterilis group, Hairy or Sand Oats, Short Oats, several distinct Wild Oats and representative varieties of the main groups of Common Oats .....	2.10
A1948. <b>SORGHUM SPECIES AND VARIETIES.</b>	Seeds only of twenty-four varieties and types of Sorghum grown in the United States.....	2.10
A1956. <b>SEEDS OF VEGETABLE CROPS.</b>	Seeds only of sixty-three Vegetable Crops. Very valuable in the study of Vegetable Crops.....	2.60
A1964. <b>TYPES OF WHEAT.</b>	Spikes and threshed seeds of nine wheat types including types of Einkorn, Emmer, Spelt, several different Common Wheats and Polish Wheat.....	2.10
A1966. <b>TYPES OF WHEATS OF WESTERN UNITED STATES.</b>	Spikes and threshed seeds of nine Wheats commonly grown in Western United States .....	2.10
A1968. <b>TYPES OF DURUM WHEATS.</b>	Spikes and threshed seeds of nine Durum Wheat varieties .....	2.10
A1970. <b>TYPES OF HARD SPRING WHEATS OF NORTHERN UNITED STATES.</b>	Spikes and threshed seeds of nine varieties of Hard Spring Wheat grown in Northern United States .....	2.10
A1972. <b>TYPES OF HARDY SPRING WHEATS OF CANADA.</b>	Spikes and threshed seeds of nine Wheats of Canada.....	2.10
A1980. <b>SEEDS OF COMMON FARM CROPS.</b>	Seeds only of sixty-five farm crops, including varieties of Wheat, Oats, Rye, Barley, Buckwheat, Corn, Millet, Grasses, Sorghum, Root Crops, Clovers and Alfalfas, Field Peas and Beans, Soybeans, Cowpeas and Vetches.....	2.10
A1986. <b>TYPES OF MISCELLANEOUS FARM CROPS.</b>	Inflorescence and seeds of nine farm crops, including types and varieties of Rye, Flax, Buckwheat, Sorghum, Rice and Cotton .....	2.10
A1994. <b>UNSOUNDNESSES OF GRAINS.</b>	Sound Grains with their chief Unsoundness shown. Twenty-four samples in all are shown, including, among others, Frosting, Weathering, Starchiness of otherwise Corneous Wheat, Scab in Wheat, Moldiness, Binburn, Shriveled Grain due to Black Stem Rust in Wheat, Sulphured Barley and Oats, etc. ....	2.10

## MISCELLANEOUS COLLECTIONS

<b>A2000. DISEASES OF FARM CROPS.</b>	Nine common diseases of Farm Crops are shown, including both plant parts and seeds, and each is discussed .....	<b>2.10</b>
<b>A2010. FEEDS FOR LIVESTOCK.</b>	Twenty-four Feeds with a general discussion of the elements in Feeds. Pyralin front case.....	<b>2.60</b>
<b>A2012. FEEDS FOR LIVESTOCK.</b>	Twenty-four Feeds in addition to those in No. A2010, with a discussion of the compounding of rations. Pyralin front case.....	<b>2.60</b>
<b>A2020. COMMERCIAL FERTILIZERS.</b>	Twenty-four Commercial Fertilizers are shown with a discussion of their composition and use. Pyralin front case .....	<b>2.60</b>
<b>A2028. DURUM WHEAT AND ITS PRODUCTS.</b>	Various steps in the reduction of Durum Wheat to Semolina and its manufactured and by-products. Pyralin front case.....	<b>2.60</b>
<b>A2032. MILL PRODUCTS OF HARD SPRING WHEAT.</b>	Whole Wheat and Ground Wheat in various steps in reduction to Flour with the by-products in the milling process. Pyralin front case	<b>2.60</b>

## TYPES AND VARIETIES OF CORN

**Note:** When ears of one variety cannot be supplied, another variety not listed will be substituted.

### EAR CORN NOT MOUNTED

**DENT CORN** (*Zea Mays Indentata*). White starchy endosperm at center and extending to summits of kernel; corneous endosperm at sides.

- A. Reid's Yellow (Illinois); yellow.
- B. Johnson County White (Indiana); white.
- C. Leaming (Illinois); yellow.
- D. Silvermine (Illinois); white.
- E. Dark County Mammoth (Ohio); yellow.
- F. Rustler (Minnesota); white.
- G. Champion White Pearl (Illinois); white.
- H. Ferguson's Yellow (Texas); yellow.
- J. Chisholm (Texas); white.
- K. Sure Cropper (Texas); white.
- L. Cocke's Prolific (Alabama); white.
- M. Cob Pipe Corn (Missouri); white.
- N. Silver King (Iowa); white.
- P. Murdock (Minnesota); yellow.
- Q. Minnesota Thirteen (Minnesota); yellow.
- R. Pride of North (Minnesota); yellow.
- S. Minnesota King (Minnesota); yellow.
- T. Minnesota Twenty-three (Minnesota); white capped yellow.
- U. Northwestern Dent (Minnesota); yellow capped red.
- V. Calico (Minnesota); yellow striped with red.
- W. Wimble's Dent (South Dakota); yellow.
- Y. Bloody Butcher (Minnesota); red.

A2050. Per single ear (in ordering give full type name) ..... \$ 0.50  
 A2051. Per set of twenty-two ears named above..... 10.30

**FLINT CORN** (*Zea Mays Indurata*). Small amount of white starchy endosperm enclosed in corneous endosperm.

- A. Triumph; 10 to 14-rowed yellow.
- B. Longfellow; 8-rowed yellow.
- C. Smutnose; 8-rowed yellow with splash of red at tip.
- D. King Philip; 8-rowed red.
- E. Gehu (Mandan Indian); 8-rowed yellow.
- F. Dakota White (Mandan Indian); 8 to 10-rowed white.
- G. Taylor's Flint (Massachusetts); 8-rowed yellow.
- H. Creole Flint (Louisiana); 12 to 16-rowed deep yellow.
- J. Squaw Flint; 8-rowed various colored kernels.

A2058. Per single ear (in ordering give full type name) ..... .50  
 A2059. Per set of nine ears named above..... 3.80

**POD CORN AND SOFT CORN.** The characteristics of the two varieties and the types furnished are as follows:—

**Pod Corn** (*Zea Mays Tunicata*), each kernel enclosed in a separate husk. (A) Dent type furnished.

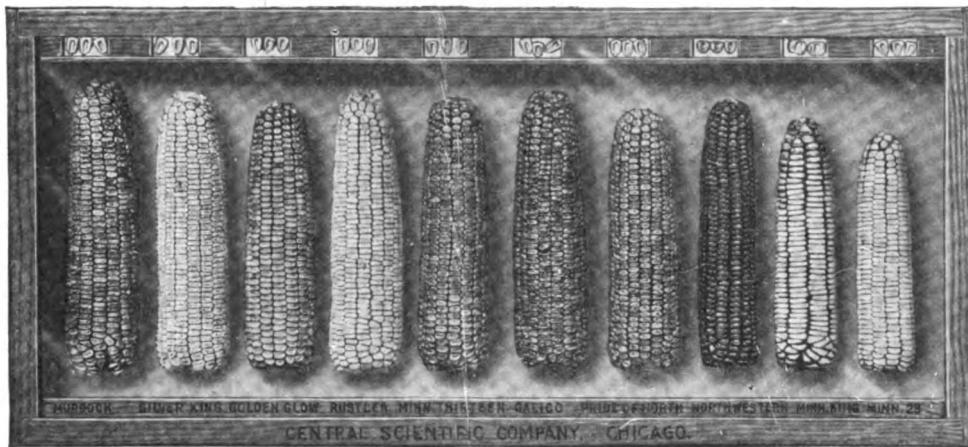
**Soft Corn** (*Zea Mays Amylaceae*), kernels having no corneous endosperm. Types furnished:  
 (B) White Soft; (C) Yellow Soft; (D) Blue Soft; (E) Red Soft; (F) Mixed Soft.

A2066. Per single ear (in ordering give full type name) ..... .50  
 A2067. Per set of six ears named above..... 2.50

**POP CORN** (*Zea Mays Everta*). Endosperm corneous. Pops when heated.

- A. White Pearl Mapledale Prolific; 12 to 14 rows.
- B. Yellow Pearl, Queen's Golden; 10 to 14 rows.
- C. Black Pearl, Black Beauty; 8 to 12 rows.
- D. White Pearl, Ball; short ear with many rows.
- E. White Rice; long ear, 10 to 14 rows.
- F. Yellow Rice, Baby Golden; short ear, 8 to 12 rows.
- G. Chocolate Rice; medium ear, 10 to 12 rows.
- H. Red Rice; medium to long ear, 10 to 14 rows.
- J. Michigan Rice; medium ear, many rows.

A2072. Per single ear (in ordering give full type name) ..... .50  
 A2073. Per set of nine ears named above..... 3.80



No. A2094.

**SWEET CORN** (*Zea Mays Saccharata*). Endosperm wrinkled and translucent in appearance. Sweet corns are corns of other groups that have lost their power of changing the sugar of the endosperm to starch.

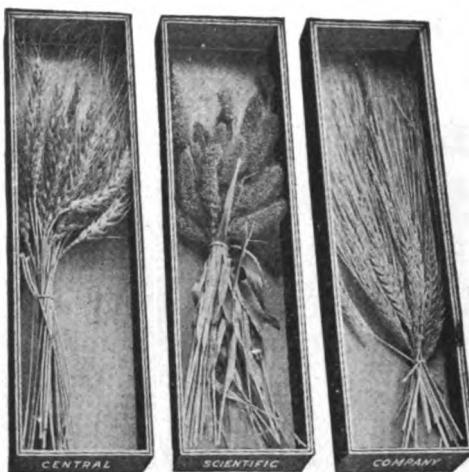
A. Stowell's Evergreen.	J. Country Gentleman.
B. Long Island Beauty.	K. Hickox.
C. Late Mammoth.	L. Golden Rod.
D. Black Mexican.	M. Early Crosby.
E. Golden Bantam.	N. White Cory.
F. Early Minnesota.	P. Peep O'Day.
G. Kendall's Early Giant.	Q. Moore's Early Concord.
H. Quincy Market.	

A2080. Per single ear (in ordering give full type name) ..... \$0.50  
 A2081. Per set of fifteen ears named above..... 6.20

#### EAR CORN—MOUNTED SAMPLES

Each set of Ear Corn listed below includes one representative ear of each of the varieties grown, mounted in a very neat, substantial, glass-covered, oak case. Kernels as well as ears are shown.

A2092. <b>CENTRAL AND SOUTHERN U. S. DENT CORNS.</b> Ten ears representing varieties grown.	Per set 10.50
A2094. <b>NORTHERN DENT CORNS.</b> Ten ears representing varieties grown.....	Per set 10.50
A2098. <b>FLINT CORNS.</b> Ten ears representing varieties grown .....	Per set 10.50
A2102. <b>POP CORNS.</b> Ten ears.....	Per set 10.50
A2106. <b>SWEET CORNS.</b> Ten ears representing varieties mostly used.....	Per set 10.50
A2108. <b>SWEET CORNS.</b> Ten ears representing varieties mostly used for eating as a green vegetable.	..... Per set 10.50
A2116. <b>BOTANICAL TYPES OF CORN.</b> Ten ears Dent, Flint, Pod, Pop, Soft and Sweet.	Per set 10.50



Nos. A2250L, A2220C, A2140H.

### TYPES AND VARIETIES OF BARLEY

**A2140. TYPES AND VARIETIES OF HEADS,** in covered pasteboard boxes containing 25 heads each.

- A. **True Six-Row Barley** (*Hordeum sativum hexastichum pyramidatum*), (1) Utah Winter or (2) Reid's Triumph, bearded white.
- B. **Common Six-Row Barley** (*Hordeum sativum vulgare pallidum*), Oderbrucker, bearded white.
- C. **Common Six-Row Barley** (*Hordeum sativum vulgare pallidum*) Mandscheuri.
- D. **Six-Row Barley** (*Hordeum sativum vulgare*), Black Canadian, bearded black.
- E. **Six-Row Barley** (*Hordeum sativum vulgare trifurcatum*), beardless white hull-less.
- F. **Six-Row Barley** (*Hordeum sativum vulgare violaceum*), bearded black hull-less.
- G. **Six-Row Barley** (*Hordeum sativum vulgare Horsfordianum*), Success Beardless, beardless white.
- H. **Two-Row Barley** (*Hordeum sativum distichum vulgare nutans*), Chevalier, long-bearded white.
- J. **Two-Row Barley** (*Hordeum sativum distichum erectum*), Svanhals, broad-bearded white.
- K. **Two-Row Barley** (*Hordeum sativum distichum nudum*), bearded white hull-less.
- L. **Two-Row Barley** (*Hordeum sativum distichum*), bearded black.
- M. **Two-Row Barley** (*Hordeum sativum distichum angustispicatum*), beardless white.

Per box of 25 heads..... \$0.50

### TYPES AND VARIETIES OF BARLEY

**A2142. TYPES AND VARIETIES OF THRESHED GRAIN,** in 4-ounce screw-capped bottles.

- A. **True Six-Row Barley** (*Hordeum sativum hexastichum pyramidatum*), (1) Utah Winter or (2) Reid's Triumph, bearded white.
- B. **Common Six-Row Barley** (*Hordeum sativum vulgare pallidum*), Oderbrucker, bearded white.
- C. **Common Six-Row Barley** (*Hordeum sativum vulgare pallidum*) Mandscheuri.
- D. **Six-Row Barley** (*Hordeum sativum vulgare*), Black Canadian, bearded black.
- E. **Six-Row Barley** (*Hordeum sativum vulgare trifurcatum*), white beardless, beardless white hull-less.
- F. **Six-Row Barley** (*Hordeum sativum vulgare violaceum*), bearded black hull-less.
- G. **Six-Row Barley** (*Hordeum sativum vulgare Horsfordianum*), Success Beardless, beardless white.
- H. **Two-Row Barley** (*Hordeum sativum distichum vulgare nutans*), Chevalier, long-bearded white.
- J. **Two-Row Barley** (*Hordeum sativum distichum erectum*), Svanhals, broad-bearded white.
- K. **Two-Row Barley** (*Hordeum sativum distichum nudum*), bearded white hull-less.
- L. **Two-Row Barley** (*Hordeum sativum distichum*), bearded black.

Per 4-ounce bottle..... .50

### TYPES OF CULTIVATED GRASSES

A2150. TYPES OF UNTHRESHED MATERIAL, in covered pasteboard boxes containing 25 heads each.

- A. Timothy (*Phleum pratense*).
- B. Brome Grass (*Bromus inermis*).
- C. Red Top (*Agrostis alba* var. *vulgaris*).
- D. Orchard Grass (*Dactylis glomerata*).
- E. Kentucky Blue Grass (*Poa pratensis*).
- F. Canadian Blue Grass (*Poa compressa*).
- G. Meadow Fescue (*Festuca elatior* var. *pratensis*).
- H. Perennial Rye Grass (*Lolium perenne*).
- J. Slender Wheat Grass (*Agropyron tenerum*).

Per box of 25 heads..... \$0.50

A2152. TYPES OF THRESHED MATERIAL, in 2-ounce screw-capped bottles.

A. Timothy.	L. Crested Dog's Tail.
B. Meadow Fescue.	M. Orchard Grass.
C. Sheep Fescue.	N. Kentucky Blue Grass.
D. Meadow Foxtail.	P. Canada Blue Grass.
E. Red Top.	Q. Brome Grass.
F. Velvet Grass.	R. Perennial Rye Grass.
G. Sweet Vernal.	S. Slender Wheat Grass.
H. Yellow Oat Grass.	T. Johnson Grass.
J. Tall Meadow Oat Grass.	U. Sudan Grass.
K. Bermuda Grass.	V. Tunis Grass.

Per 2-ounce bottle..... .50

### SMALL SEDED LEGUMES

A2160. TYPES OF HEADS, in covered pasteboard boxes of 25 heads each.

- A. Medium Red Clover (*Trifolium pratense*).
- B. Alsike Clover (*Trifolium hybridum*).
- C. White Clover (*Trifolium repens*).
- D. Common Alfalfa (*Medicago sativa*).
- E. White Sweet Clover (*Melilotus alba*).

Per box of 25 heads..... .50

A2162. TYPES OF THRESHED MATERIAL, in 2-ounce screw-capped bottles.

A. Alsike Clover.	K. Yellow Annual Sweet Clover.
B. Medium Red Clover.	L. White Clover.
C. Mammoth Red Clover.	M. Lespedeza.
D. Alfalfa Grimm.	N. Florida Beggarweed.
E. Alfalfa Common.	P. Common Vetch.
F. Toothed Bur Clover.	Q. Winter Vetch.
G. Spotted Bur Clover.	R. Derradella.
H. White Sweet Clover.	S. Sainforn.
J. Yellow Sweet Clover.	T. Crimson Clover.

Per 2-ounce bottle..... .50

### LARGE SEDED LEGUMES

A2166. TYPES OF PEANUTS (*Arachis hypogea*), in 4-ounce screw-capped bottles.

- A. Peanut—Valencia.
- B. Peanut—Spanish.
- C. White Lupine.

Per 4-ounce bottle..... .50

A2172. TYPES OF FIELD BEANS (*Phaseolus*), in 2-ounce screw-capped bottles.

A. Navy Pea.	M. White Kidney.
B. Navy Medium.	N. Improved Yellow Eye.
C. White Marrow.	P. Old Fashioned Yellow Eye.
D. Bayou (West).	Q. Black Turtle Soup.
E. Lady Washington (West).	R. Great Northern.
F. Pink (West).	S. Pearce's Improved.
G. Garaypata (Mexico).	T. Brown Swedish.
H. Red Mexican (West).	U. Boston Favorite.
J. Tepary (Southwest).	V. Ruby Horticultural Bush.
K. Garvanza, Chick Pea (Southwest).	W. Lardon Horticultural Pole.
L. Red Kidney.	

Per 2-ounce bottle..... .50

A2176. TYPES OF SOY BEANS (*Soja max*), in 2-ounce screw-capped bottles.

A. Mammoth.	J. Biloxi.	S. Hollybrook.
B. Medium Yellow.	K. Arlington.	T. Ogema.
C. Guelph.	L. Jet.	U. Elton.
D. Ito San.	M. Cloud.	V. Early Brown.
E. Wilson.	N. Ebony.	W. Habaro.
F. Peking.	P. Austin.	X. Tarheel.
G. Mauchu.	Q. Wisconsin Black.	Y. Chiquita.
H. Black Eyebrow.	R. Chestnut.	Z. Early Brown.

Per 2-ounce bottle..... \$0.50

A2180. TYPES OF VELVET BEANS (*Stizolobium*), in 4-ounce screw-capped bottles.

A. Florida Speckled.	D. Osceola Velvet.
B. Chinese Velvet.	E. Lyon Bean.
C. Yokohama Bean.	

Per 4-ounce bottle..... .50

A2196. TYPES OF COW PEAS (*Vigna sinensis*), in 2-ounce screw-capped bottles.

A. Clay (group).	L. Wonderful.
B. Michigan Favorite.	M. Blacks (group).
C. Early Buff.	N. Holstein.
D. Whippoorwill.	P. Blackeyed Lady.
E. New Era.	Q. Brown Eye.
F. Groit.	R. Lady.
G. Brabham.	S. Cream.
H. Taylor.	T. Conch.
J. Iron.	U. Early Ramshorn Blackeye.
K. Red Ripper.	V. Catjang.

Per 2-ounce bottle..... .50

A2200. TYPES OF FIELD PEAS (*Pisum sativum arvense*), in 2-ounce screw-capped bottles.

A. Golden Vine.	L. Gray Winter.
B. Kaiser.	M. O'Rourke.
C. Scotch Blue.	N. Early Britain.
D. Bangalia.	P. Solo.
E. Arthur.	Q. Amraoti.
F. Cavalier.	R. Blackeyed Marrowfat.
G. Lima.	S. French June.
H. Carleton.	T. Canadian Beauty.
J. Khaba.	U. English Gray.
K. Prussian Blue.	V. Kabilya.

Per 2-ounce bottle..... .50

## TYPES AND VARIETIES OF MILLET

## A2220. TYPES AND VARIETIES OF HEADS, in covered pasteboard boxes containing 25 heads each.

A. Pearl Millet ( <i>Pennisetum spicatum</i> ).	
B. Common Millet ( <i>Setaria italica</i> ).	
C. Hungarian Millet ( <i>Setaria italica</i> ).	
D. German Millet ( <i>Setaria italica</i> ).	
E. Red Siberian Millet ( <i>Setaria italica</i> ).	
F. Kursk Millet ( <i>Setaria italica</i> ).	
G. Early Fortune Millet ( <i>Panicum miliaceum</i> ).	
H. Red Turghai Millet ( <i>Panicum miliaceum</i> ).	
J. Red Russian Millet ( <i>Panicum miliaceum</i> ).	
K. White Ural Millet ( <i>Panicum miliaceum</i> ).	
L. Black Voronezh Millet ( <i>Panicum miliaceum</i> ).	
M. Japanese Barnyard Millet ( <i>Echinochloa frumentacea</i> ).	

Per box of 25 heads..... .50

## A2222. TYPES AND VARIETIES OF THRESHED MATERIAL, in 2-ounce screw-capped bottles.

A. Pearl Millet ( <i>Pennisetum spicatum</i> ).	
B. Common Millet ( <i>Setaria italica</i> ).	
C. Hungarian Millet ( <i>Setaria italica</i> ).	
D. German Millet ( <i>Setaria italica</i> ).	
E. Red Siberian Millet ( <i>Setaria italica</i> ).	
F. Kursk Millet ( <i>Setaria italica</i> ).	
G. Early Fortune Millet ( <i>Panicum miliaceum</i> ).	
H. Red Turghai Millet ( <i>Panicum miliaceum</i> ).	
J. Red Russian Millet ( <i>Panicum miliaceum</i> ).	
K. White Ural Millet ( <i>Panicum miliaceum</i> ).	
L. Black Voronezh Millet ( <i>Panicum miliaceum</i> ).	
M. Japanese Barnyard Millet ( <i>Echinochloa frumentacea</i> ).	

Per 2-ounce bottle..... .50



No. A2142A.



No. A2232A.



No. A2252F.



No. A2260A.

### TYPES AND VARIETIES OF OATS

A2230. **TYPES AND VARIETIES OF PANICLES**, in covered pasteboard boxes containing 25 panicles each.

- A. White Oats (*Avena sativa*), spreading panicle, medium maturing. Improved Ligowa. Minnesota No. 281.
- B. White Oats (*Avena sativa*), spreading panicle, medium maturing. Swedish Select.
- C. Yellow Oats (*Avena sativa*), spreading panicle, early maturing. Sixty-day Minnesota No. 261.
- D. Yellow Oats (*Avena sativa*), spreading panicle, early maturing. Kherson.
- E. Black Oats (*Avena sativa*), spreading panicle, medium maturing. Garton 396.
- F. White Oats (*Avena sativa*), side panicle, medium maturing. Garton 364.
- G. White Oats (*Avena sativa*), side panicle, late maturing, White Russian.
- H. Black Oats (*Avena sativa*), side panicle, medium maturing. Garton 948.
- J. Wild Oats (*Avena fatua*).

Per box of 25 panicles..... \$0.50

A2232. **TYPES AND VARIETIES OF THRESHED GRAIN**, in 4-ounce screw-capped bottles.

- A. White Oats (*Avena sativa*), spreading panicle, medium maturing. Improved Ligowa. Minnesota No. 281.
- B. White Oats (*Avena sativa*), spreading panicle, medium maturing. Swedish Select.
- C. Yellow Oats (*Avena sativa*), spreading panicle, early maturing. Sixty-day Minnesota No. 261.
- D. Yellow Oats (*Avena sativa*), spreading panicle, early maturing. Kherson.
- E. Black Oats (*Avena sativa*), spreading panicle, medium maturing. Garton 396.
- F. White Oats (*Avena sativa*), side panicle, medium maturing. Garton 364.
- G. White Oats (*Avena sativa*), side panicle, late maturing, White Russian.
- H. Black Oats (*Avena sativa*), side panicle, medium maturing. Garton 948.

Per 4-ounce bottle..... .50

### TYPES AND VARIETIES OF SORGHUM

(*ANDROPOGON SORGHUM*)

A2240. **TYPES AND VARIETIES OF HEADS**, in covered pasteboard boxes containing 1 head each, except A, which contains from 10 to 15 heads.

A. Sudan Grass.	J. Milo.
B. Amber Sorghum.	K. Feterita.
C. White Amber Sorghum.	L. White Durra.
D. Sumac Sorghum.	M. Brown Durra.
E. Orange Sorghum.	N. New Shallu.
F. Red Kaffir.	P. Red Kowliang.
G. Black Hulled White Kaffir.	Q. Standard Broom Corn.
H. Pink Kaffir.	R. Dwarf Broom Corn.

Per box ..... .50

### TYPES AND VARIETIES OF SORGHUM, Continued.

**A2242. TYPES AND VARIETIES OF THRESHED MATERIAL,** in 4-ounce screw-capped bottles.

A. Sudan Grass.	J. Milo.
B. Amber Sorghum.	K. Feterita.
C. White Amber Sorghum.	L. White Durra.
D. Sumac Sorghum.	M. Brown Durra.
E. Orange Sorghum.	N. New Shallu.
F. Red Kaffir.	P. Red Kowliang.
G. Black Hulled White Kaffir.	Q. Standard Broom Corn.
H. Pink Kaffir.	R. Dwarf Broom Corn.

Per 4-ounce bottle..... \$0.50

### TYPES AND VARIETIES OF WHEAT

**A2250. TYPES AND VARIETIES OF HEADS,** in covered pasteboard boxes containing 25 heads each.

A. Einkorn ( <i>Triticum monococcum</i> ).	
B. Spelt ( <i>Triticum spelta</i> ), beardless variety.	
C. Spelt ( <i>Triticum spelta</i> ), bearded variety.	
D. Emmer ( <i>Triticum dicoccum</i> ), bearded white spring variety.	
E. Emmer ( <i>Triticum dicoccum</i> ), bearded black winter variety.	
F. Common Wheat ( <i>Triticum sativum vulgare</i> ), Blue Stem, beardless spring, with pubescent white glumes.	
G. Common Wheat ( <i>Triticum sativum vulgare</i> ), Fife, beardless spring, with smooth white glumes.	
H. Common Wheat ( <i>Triticum sativum vulgare</i> ), beardless spring, with smooth red glumes.	
J. Common Wheat ( <i>Triticum sativum vulgare</i> ), Velvet Chaff, bearded spring, with smooth white glumes.	
K. Common Wheat ( <i>Triticum sativum vulgare</i> ), Humpback, bearded spring, with smooth white glumes.	
L. Common Wheat ( <i>Triticum sativum vulgare</i> ), Turkey Red, bearded winter, with smooth white glumes.	
M. Common Wheat ( <i>Triticum sativum vulgare</i> ), beardless winter, with smooth red glumes.	
N. Common Wheat ( <i>Triticum sativum vulgare</i> ), Fultz, beardless winter, with smooth white glumes.	
P. Common Wheat ( <i>Triticum sativum vulgare</i> ), Kharkov, bearded winter, with smooth white glumes.	
Q. Club Wheat ( <i>Triticum sativum compactum</i> ), Little Club, beardless, with smooth white glumes.	
R. Club Wheat ( <i>Triticum sativum compactum</i> ), Washington Club, bearded.	
S. Poulard Wheat ( <i>Triticum sativum turgidum</i> ), Alaska, bearded spring, with branched spikes and smooth white glumes.	
T. Durum Wheat ( <i>Triticum sativum durum</i> ), Kubanka, bearded spring, with smooth glumes.	
U. Polish Wheat ( <i>Triticum polonicum</i> ), Polish, bearded spring, with smooth white glumes.	

Per box of 25 heads..... .50

**TYPES AND VARIETIES OF WHEAT, Continued.****A2252. TYPES AND VARIETIES OF THRESHED GRAIN,** in 4-ounce screw-capped bottles.

- B. **Spelt** (*Triticum spelta*), beardless variety.
- C. **Spelt** (*Triticum spelta*), bearded variety.
- D. **Emmer** (*Triticum dicoccum*), bearded white spring variety.
- E. **Emmer** (*Triticum dicoccum*), bearded black winter variety.
- F. **Common Wheat** (*Triticum sativum vulgare*), Blue Stem, beardless spring, with pubescent white glumes.
- G. **Common Wheat** (*Triticum sativum vulgare*), Fife, beardless spring, with smooth white glumes.
- H. **Common Wheat** (*Triticum sativum vulgare*), beardless spring, with smooth red glumes.
- J. **Common Wheat** (*Triticum sativum vulgare*), Velvet Chaff, bearded spring, with smooth white glumes.
- K. **Common Wheat** (*Triticum sativum vulgare*), Humpback, bearded spring, with smooth white glumes.
- L. **Common Wheat** (*Triticum sativum vulgare*), Turkey Red, bearded winter, with smooth white glumes.
- M. **Common Wheat** (*Triticum sativum vulgare*), beardless winter, with smooth red glumes.
- N. **Common Wheat** (*Triticum sativum vulgare*), Fultz, beardless winter, with smooth white glumes.
- P. **Common Wheat** (*Triticum sativum vulgare*), Kharkov, bearded winter, with smooth white glumes.
- Q. **Club Wheat** (*Triticum sativum compactum*), Little Club, beardless, with smooth white glumes.
- R. **Club Wheat** (*Triticum sativum compactum*), Washington Club, bearded.
- S. **Poulard Wheat** (*Triticum sativum turgidum*), Alaska, bearded spring, with branched spikes and smooth white glumes.
- T. **Durum Wheat** (*Triticum sativum durum*), Kubanka, bearded spring, with smooth glumes.
- U. **Polish Wheat** (*Triticum polonicum*), Polish, bearded spring, with smooth white glumes.

Per 4-ounce bottle..... \$0.50

**MISCELLANEOUS PLANTS****A2260. TYPES OF HEADS,** in covered pasteboard boxes containing from 6 to 25 heads each.

- A. **Winter Rye**, Swedish Minnesota No. 2.
- B. **Spring Rye**.
- C. **Flax**, Blue Blossomed Dutch, Minnesota No. 25.
- D. **Japanese Buckwheat**.
- E. **Silverhull Buckwheat**.
- F. **Rice**.
- G. **Cotton**.

Per box ..... .50

**A2262. TYPES OF THRESHED MATERIAL,** in 2-ounce screw-capped bottles.

A. Spring Rye.	M. Rough Rice (small seeded).
B. Winter Rye.	N. Mangel.
C. Flax (common).	P. Sugarbeet.
D. Flax (golden).	Q. Turnip.
E. Hemp.	R. Rutabaga.
F. Jute.	S. Rape.
G. Japanese Buckwheat.	T. Castor Bean.
H. Silverhull Buckwheat.	U. Cotton.
J. Rye Buckwheat.	V. Alfilaria.
K. Tartarian Buckwheat.	W. Sunflower.
L. Rough Rice (large seeded).	X. Australian Saltbrush.

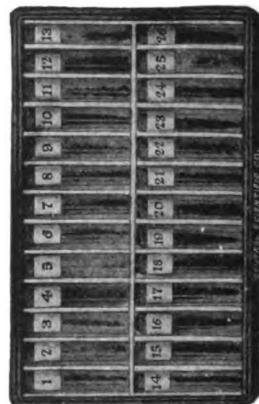
Per 2-ounce bottle..... .50



No. A2300.



No. A2310.



No. A2316.

### PLANT ENEMIES (Diseases and Weeds)

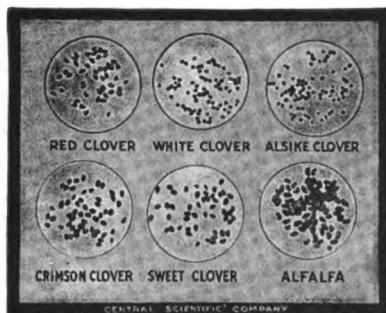
The collections listed on this page are prepared by the Department of Botany of the North Dakota Agricultural College.

A2300. **PLANT DISEASE COLLECTION**, showing twenty typical plant diseases. Each specimen is enclosed in a box with celluloid topped sliding cover, and the entire set is contained in a substantial case about  $17\frac{1}{4} \times 11\frac{1}{2} \times 1$  in. Descriptions are included..... \$4.80

A2310. **WEED COLLECTION, No. 1**. A portfolio showing specimens of mature and immature plants corresponding to No. A2316 Weed Seed Collection, mounted on heavy cards about  $16\frac{1}{2} \times 11\frac{1}{2}$  inches, with full descriptions..... 4.80

A2316. **WEED SEED COLLECTION, No. 1**. Seeds of twenty-six weeds in labeled vials as follows: Canada Thistle, Chess, Cockle (2 var.), False Flax, Frenchweed, Marsh Elder, Mustard (4 var.), Peppergrass, Pigeon Grass, Pigweed (3 var.), Prickly Lettuce, Quack Grass, Ragweed, Russian Thistle, Shepherd's Purse, Sunflower, Water Hemlock, Wild Barley, Wild Buckwheat, Wild Oats. In heavy compartment pasteboard box about  $9\frac{1}{2} \times 5\frac{1}{2} \times 3\frac{3}{4}$  inches..... 3.15

A2318. **WEED SEED COLLECTION, No. 2**. Same as No. A2316, but with the following twenty-six specimens: Beggar Tick, Bindweed, Bur Clover, Catchfly, Chicory, Cinquefoil, Cocklebur, Crab Grass, Dock, Dodder (3 var.), Ergot, Evening Primrose, Holy Grass, Milkweed, Persicaria, Plantain (2 var.), Ragweed, Sandbur, Sorrel, Sow Thistle, Sweet Clover, Vetch, Witch Grass ..... 3.15



No. A2350.

**SEED SPECIMENS****FOR EXAMINATION UNDER SIMPLE MICROSCOPE.**

The sets of seeds listed below are mounted between two lantern slide plates, and are therefore especially well adapted for low power microscopical examination, since an abundance of illumination can be obtained from below. The seeds included are mainly those of clover, grasses and common weeds, and as they are put up under the direction of a prominent agriculturalist at one of the large State Universities, their satisfactory character is assured. Both the common and the botanical names of the specimens are printed below them on both sides of the card.

A2340. GRASSES .....	Smooth Brome Bromus inermis Tall Oat Arrhenatherum elatius	Bermuda Capriola dactylon Italian Rye Lolium italicum	Orchard Dactylis glomerata Perennial Rye Lolium perenne	.50
A2342. GRASSES .....	Redtop Argostis alba Timothy Phleum pratense	Sheep's Fescue Festuca ovina Meadow Fescue Festuca elatior pratensis.	Kentucky Blue Poa pratensis Canada Blue Poa compressa	.50
A2350. LEGUMES .....	Red Clover Trifolium pratense Alsike Clover Trifolium hybridum	White Clover Trifolium repens Alfalfa Medicago Sativa	Crimson Clover Trifolium incarnatum Sweet Clover Melilotus alba	\$0.50
A2360. WEEDS .....	Yellow Trefoil Medicago lupulina Crab Grass Syntherisma linearis	Dodder Cuscuta arvensis Buckhorn Plantago lanceolata	Mustard Brassica nigra Broad Plantain Plantago rugelii	.50
A2362. WEEDS .....	Dock Rumex crispus Moth Mullein Verbascum blattaria	Pigweed Amaranthus retroflexus Eagweed Ambrosia artemisioefolia.	Lamb's-quarter Chenopodium album Wild Carrot Daucus carota	.50
A2364. WEEDS .....	Old Witch Grass Panicum capillare Smartweed Polygonum lapathifolium.	Chicory Cichorium intybus Vervain Verbena hastata	Sorrel Rumex acetosella Canada Thistle Carduus arvensis	.50

**MATERIALS FOR MOUNTING SEED SPECIMENS**

A2370. PERFORATED CARDS, 3 1/4 x 4 inches, with six holes 1 inch in diameter, without printing.	Per dozen .50
	Per hundred 3.50
F7771. SLIDE COVER GLASSES, 3 1/4 x 4 inches. Two required with each card.....	Per dozen .40
F7757. SLIDE BINDING, in strips, one strip required with each card. Binder's black cloth, heavily gummed on one side with a special gum.....	Per 50 strips .18



Nos. 12084-5.



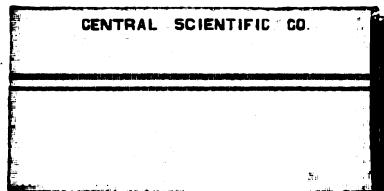
Nos. 12086-7.



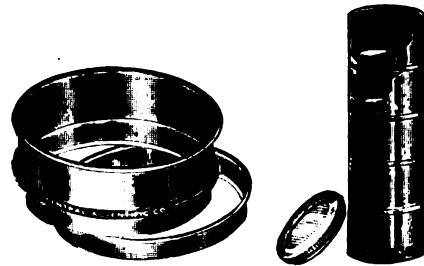
No. 12104.



No. 12090.



No. 12098.



No. 12096.



No. 12110.

## SIEVES

**SIEVES, Brass Frame**, seamless, brass gauze (for Covers and Bottom Pans see Nos. 12102 and 12104).

	Mesh	10	20	40	60	80	100	200
12084.	Each, 5 inches in diameter	\$1.75	1.75	1.75	1.75	2.00	2.25	4.00
12085.	Each, 8 inches in diameter	3.00	3.00	3.00	3.00	3.50	4.00	7.50

**SIEVES**, same as Nos. 12084 and 12085, in sets of five, one sieve fitting on top of another, with one cover and one bottom pan; set consists of 20, 40, 60, 80 and 100 mesh.

12086.	Per set, 5 inches in diameter	10.90
12087.	Per set, 8 inches in diameter	18.50

12090. **SIEVES, Brass Frame**, seamless, having sheet brass bottom with circular perforations. Extensively used in soil analysis and seed testing. Diameter, 5 inches.

Diameter of perforations, mm.	1/2	1	2	3	5
Each	2.10	2.00	1.80	1.80	1.80

12091. **SIEVES**, complete set of five of No. 12090, with brass cover and bottom pan..... 10.50

12092. **SIEVES**, set same as No. 12091, with 3 mm and 5 mm sieves omitted..... 6.70  
For Cover and Bottom Pans see Nos. 12102 and 12104.

12096. **SIEVE FRAME**, same as No. 12090 without bottom, but with brass ring for holding bolting cloth. Diameter, 5 inches..... 1.25

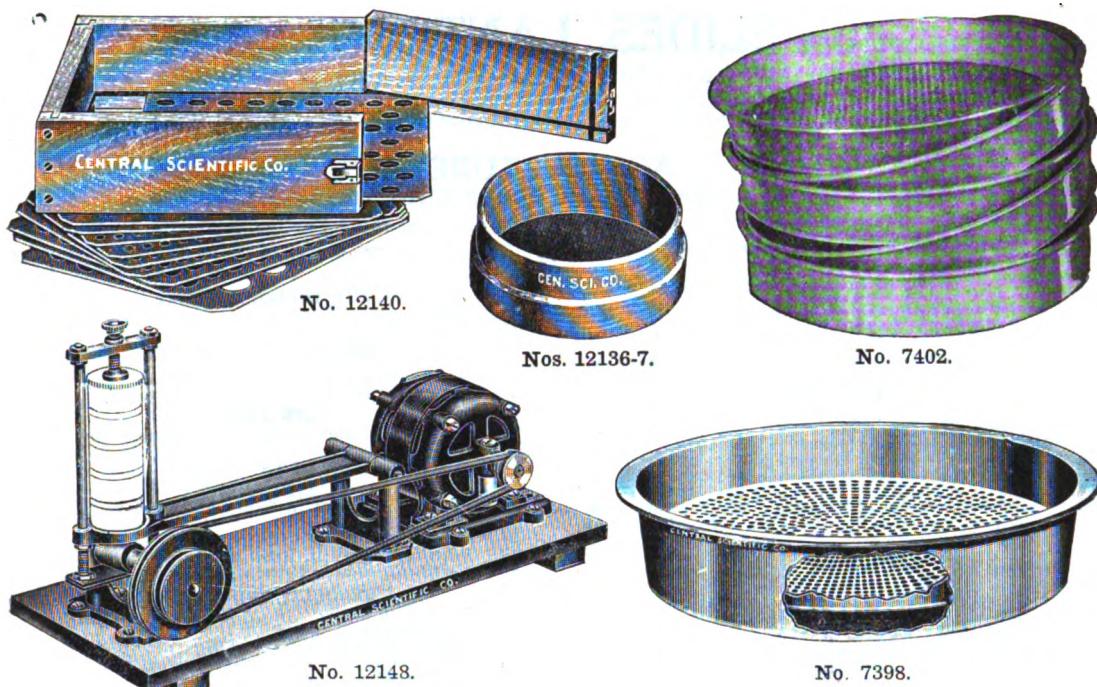
12098. **BOLTING CLOTH, Silk**, for making sieves, etc., of standard weight, 40 inches wide.  
No. .... 2 5 7 9 11 13 15 18 20 25  
Mesh per linear inch.. 52 64 80 96 116 130 148 168 173 200  
Per linear foot..... 2.40 2.80 3.00 3.20 3.80 4.60 5.40 7.20 10.00 11.00

12102. **COVERS** for Nos. 12084 to 12096.  
Diameter, inches..... 5 8  
Each ..... .80 1.10

12104. **BOTTOM PANS** for Nos. 12084 to 12096.  
Diameter, inches..... 5 8  
Each ..... .60 .90

12110. **SIEVES, Bureau of Soils Type**, as employed in the Laboratories of the Bureau of Soils, Washington, D. C., for mechanical analysis. Set of four sieves turned from heavy brass castings with bottom pan and cover, each about 2 inches in diameter by 1 inch high, perfectly fitted, so that the set may be well shaken without coming apart. Shaped so that there is no loss of the sample, a great advantage where small samples are being tested. Sieves proper are readily replaceable; upper two of brass, with perforations 1 mm and 0.5 mm in diameter; lower two of bolting cloth 64 and 130 mesh..... per set 11.00

For Shaker for No. 12110 Sieves, see No. 12148.



7398. **SIEVE, Corn Test**, of aluminum according to specifications of the United States Department of Agriculture, consisting of one sieve with 14/64 inch round holes, and one bottom pan, 13 inches in diameter by 3 inches deep.....**Per set \$4.50**

**SIEVES, Wheat Dockage**, according to Government specifications, consisting of a set of five sieves, 13 inches in diameter, and bottom pan, constructed of aluminum, telescoping. Consists of a buckwheat sieve with 8/64 inch triangular perforations; a fine seed sieve with 1/12 inch round perforations; a scalper sieve with 12/64 inch round perforations; a fine chess sieve with slotted perforations 0.064 by  $\frac{3}{8}$  inch; and a coarse chess sieve with perforations 4 $\frac{1}{2}$ /64 by  $\frac{1}{2}$  inch. (See Regulatory Announcement No. 33 of Federal Wheat Grades Effective July 15, 1918.)

No. ....	A	B	C	D	E	F
Type of sieve..	Buckwheat	Fine Seed	Scalper	Fine Chess	Coarse Chess	Bottom Pan

7401. **Each** ..... 2.25  
7402. **Per set of four**, consisting of A, B, C, and E, with bottom pan..... 8.00

Note: Fine chess sieve No. D may be substituted for No. E in the set if desired.

**SIEVES, Wood Frame**, brass gauze.

Mesh .....	20	40	60	80	100	200
12136. <b>Each, 6 inches in diameter</b> .....	.55	.60	.80	.90	1.10	3.20
12137. <b>Each, 8 inches in diameter</b> .....	.70	.80	1.10	1.30	1.60	3.50

12140. **SIEVES, Wood Frame**, consisting of a heavy wooden frame provided with a slot in which may be placed bottoms of perforated steel, and hinged at one end to facilitate removal and replacement of these metal bottoms. Inside dimensions of frame, 17 $\frac{1}{2}$  x 14 x 5 inches. Ten bottoms are included with perforations of  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1, 1 $\frac{1}{4}$ , 1 $\frac{1}{2}$ , 2, 2 $\frac{1}{2}$ , and 3 inches..... 25.00

12148. **SIEVE SHAKER, for Power**, for use with No. 12110 Sieves. A motor of 1/20 h. p. is mounted on the same base with an eccentric shaft, to which it is belted. The set of sieves is clamped in a frame at the end of a long lever arm which rests on the eccentric. This lever arm is so attached to the eccentric that with each revolution of the cam the sieves are struck sharply, raised and dropped with a motion similar to that used in shaking by hand. Without sieves. (See Bulletin No. 84, United States Department of Agriculture, Bureau of Soils.)

No. ....	A	B	C	D
			A.C.	D.C.
For volts .....	110	220	110	220
<b>Each</b> .....	60.00	62.00	55.00	58.00

12210. **SOAP, Green Oil, U. S. P. Quality**, a soft soap of potash base with strongly detergent properties. Widely used for antiseptic purposes in connection with surgical and bacteriological work. Useful for many purposes around the chemical laboratory, such as cleaning glass and porcelain, desk tops, sinks, stained hands, etc. In concentrated form, for solution in water.

No. ....	A	B	C
Style package .....	jar	can	pail
Weight, pounds.....	1	2	5
<b>Each</b> .....	.65	1.00	2.05

**SOAP, Palm Oil**, see No. 8952.

## SLIDES, LANTERN

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**A2500. ELEMENTARY BOTANY.** Copied from pictures by permission of Messrs. Longmans & Company ..... Each, Duty Free \$0.50

<b>THE ROOT</b>	28. Definite.	<b>THE INFLORESCENCE</b>
1. Varied forms assumed by root.	29. Indefinite.	
2. Its endogenous nature; its cap and hairs.		<b>SUBSIDIARY ORGANS</b>
3. Development in a Mono- and a Dicotyledon.	30. Hairs, Unicellular—Multicellular.	
4-5. Transverse sections of Ranunculus Acris, showing the centripetal formation of wood.	31. Spines, Prickles, Phyllodes, Phylloclades.	<b>THE FRUIT</b>
<b>THE STEM</b>	32. Indehiscent, and diagram to illustrate Dehiscent.	
6. Subterranean and prone forms.	33. Dehiscent.	
7. Diagram of Dicotyledon.	34. Development of Arillus of Yew.	<b>THE SEED</b>
8. Diagram of Monocotyledon.		35. Position of Ovule in Ovary and Embryo in Endosperm.
9. Transverse section of Dicotyledon.		36. Comparison of Mono- and Dicotyledon.
10. Longitudinal section of Dicotyledon.		37. Fertilisation of an Angiosperm.
11. Transverse section of Monocotyledon.		38. Fertilisation of a Gymnosperm.
12. Transverse section of Dracaena, showing formation of new Vascular Bundles from Extra Fascicular Cambium.		<b>THE CELL AND VESSEL</b>
<b>THE LEAVES</b>	39. Variety in shape.	
13. Simple entire } Types of leaves.	40-41. Thickening of walls.	
14. Simple divided }	42. Special marking on cell walls.	
15. Compound	43. Its contents (A) Chlorophyll; circulation, rotation, occurrence in bands.	
16. Particular forms of leaf.	44. Its contents (B) Starch, Aleurone, in situ.	
17. Arrangement of leaves on stem.	45. Its contents (C) Crystals.	
18. Transverse section through Stomata into Intercellular Spaces.	46. Conjugation, Multiplication, and Free Cell Formation.	
19. Aestivation.	47. Sieve Tubes, Utricular and Laticiferous Vessels.	
20. Vernation.	48. Cells, with contents of varying density.	<b>THE TISSUES.</b>
<b>THE FLOWER</b>	49. Parenchyma, Prosenchyma, and Collenchyma.	
21. Perfect, Pistillate, Staminate, and Neuter Flowers.	50. Resin passage.	
22. The Floral Diagram.		<b>FRUITS AND SEEDS</b>
23. The Calyx, various forms of.	51. Vert. sect. of a grain of Oat, showing Embryo and Endosperm.	
24. The Corolla, various forms of.	52. Trans. sect. of Cotyledon of Pea.	
25. The Stamen, various forms of.	53. Embryo of Oat, trans. sect.	
26. The Pollen, various forms of.	54. Seed of Sweet Vernal Grass.	<b>GENERAL STRUCTURE</b>
27. The Pistil, various forms of.	55. Long. sect. stem Lettuce, to show Milk Tubes.	
A2501. Same as No. A2500, but colored.....	56. Sect. stem Vegetable Marrow, to show Sieve Plates.	
A2510. <b>AGRICULTURAL BOTANY.</b> Direct Photo-Micrographs .....	57. Epidermis of leaf of Grass, to show Stomata.	
<b>ROOTS</b>	58. Stinging Hairs of Nettles.	
1. Growing tip of root of Barley, long. sect.	59. Section of Potato, Cells containing Starch and Cork Cells of Rind.	
2. Trans. sect. root of Maize, showing root hairs.	60. <b>PUCINIA GRAMINIS IN STAGES</b>	
3. Trans. sect. root of Maize, showing branching.	61. Rust on stem of Wheat.	
4. Trans. sect. root, enlarging Turnip.	62. Mildew on stem of Wheat.	
5. Trans. sect. stem of host, showing sucker roots of Dodder ( <i>Cuscuta Trifolia</i> ).	63. Barberry (Acidum Berberidis).	
<b>STEMS</b>	64. Club root in Turnips, showing enlargement of cells.	
6. Trans. sect. stem of Oat.	65. Ergot of Rye. Claviceps Purpuria.	
7. Trans. sect. stem of Bean.	66. Smut of Wheat, Ustilago Segetum.	
8. Long. sect. stem of Bean.	67. Potato Disease, Fungus on Leaf, Peronospora Infestans.	
9. Long. sect. bud of Lime Tree.		<b>THE LIFE OF THE WHEAT PLANT FROM SEED TO SEED.</b>
<b>LEAVES</b>		Photographed by special permission from a series of diagrams published by the Royal Agricultural Society of England
10. Vert. sect. leaf of Bean.		..... Each, Duty Free .50
11. Vert. sect. leaf of Oat.		
12. Vert. sect. leaf of Cabbage, white.		
<b>FLOWERS</b>		
13. Trans. sect. of an Anther.		
14. Trans. sect. of an Ovary of Potato.		
<b>A2520. THE LIFE OF THE WHEAT PLANT FROM SEED TO SEED.</b>		
1. The structure of the Grain, I. 6 diagrams.	10. Growth of the Ear and Flower, II. 3 diagrams.	
2. The structure of the Grain, II. 2 diagrams.	11. Growth of the Ear and Flower, III. 6 diagrams.	
3. Germination of the Grain, I. 6 diagrams.	12. The Flower, I. 6 diagrams.	
4. Germination of the Grain, II. 4 diagrams.	13. The Flower, II. 10 diagrams.	
5. The Young Plant, I. 5 diagrams.	14. Ripening of the Grain, I. 8 diagrams.	
6. The Young Plant, II. 4 diagrams.	15. Ripening of the Grain, II. 7 diagrams.	
7. Early growth of the Ear, I. 5 diagrams.	16. The Wheat Straw, I. 2 diagrams.	
8. Early growth of the Ear, II. 4 diagrams.	17. The Wheat Straw, II. 5 diagrams.	
9. Growth of the Ear and Flower, I. 4 diagrams.		<b>A2530. THE LIFE HISTORY OF WHEAT.</b> Direct Photo-Micrographs .....
		Each, Duty Free .50
1. Wheat plant Stem, trans. section, stained.	8. Wheat Plant Starch, isolated.	
2. Wheat, long. section of one-half, stained.	9. Smut in Grain of Wheat, Ustilago Segetum.	
3. Wheat Root, trans. section, stained.	10. Mildew on Stem of Wheat, Puccinia Graminis.	
4. Wheat Leaf, trans. section, stained.	11. Spores of Bunt Fungus in Corn, Uredo Foetida.	
5. Wheat, Silicious Cuticle, section, stained.	12. Wheat Stem Fly.	
6. Wheat Fruit, long. section of Embryo, stained.	13. Eel Blight from Wheat, Vibrio Tritici.	
7. Wheat Plant Fruit, trans. section of Endosperm, stained.	14. Meal Mites, Tyroglyphus Farinoe.	

## SLIDES, LANTERN—Continued

**A2540. ILLUSTRATIONS FROM THE RESULTS OF THE ROTHAMSTED EXPERIMENTS.** Published under the authority of the Lawe's Agricultural Trust.....Each, Duty Free \$0.50

Tables of results of experiments on the growth of Root-crops for many years in succession on the same land:	28. Table showing the Home Produce, Import, Consumption, and Price, of Wheat, in the United Kingdom—40 harvest-years, 1852-3 to 1891-2 inclusive.
1. White Turnips, and Swedish Turnips, commencing 1843.	29. List of the Rothamsted Field Experiments.
2. Sugar Beet, 5 years, 1871-5.	30. Plan of the Plots in Barnfield, on which the experiments with Root-crops have been made.
3. Mangel Wurzel, commencing 1876.	31. Plan of the Plots in Hoosfield, on which experiments have been made:
4. Table of results of experiments on the growth of Barley for many years in succession on the same land, commencing 1852.	(1) On Barley, commencing 1852. (2) On Leguminous Crops, commencing 1849. (3) On Alternate Wheat and Fallow, commencing 1851. (4) On Potatoes, commencing 1876.
Tables of results of experiments on the growth of various Leguminous Crops, each for many years in succession on the same land, commencing 1847:	32. Plan of the Plots in Broadbalk Field, on which Wheat has been grown for more than 50 years in succession, commencing 1843-4.
5. Produce of Beans, per acre per annum.	33. Plan of the Plots in Agdell Field, on which experiments on Four-Course Rotation have been made, commencing 1848.
6. Nitrogen in the Produce of Beans, per acre per annum.	34. Plan of the Plots in the Park, on which experiments have been made on the Mixed Herbage of Permanent Grass-land, commencing 1856.
7. Produce of Red Clover (as Hay), on ordinary arable land.	35. Photographs and Plans of the Rothamsted Laboratory.
8. Produce of Red Clover (Hay and Constituents), on rich garden soil.	36. Photographs and Plan of the Rothamsted Sample House.
9. Table of results of experiments on the Growth of Wheat for many years in succession on the same land, commencing 1843-4.	37. Colored Drawing and Description of the Rothamsted Rain Gages.
Tables of results of experiments on Rotation of Crops; 45 years commencing 1848:	38. Colored Drawing and Description of the Rothamsted Drain Gages.
10. Swedish Turnips, produce per acre; 12 courses.	39. Table showing the Rainfall at Rothamsted, measured in a gage one-thousandth of an acre in area—40 harvest-years, 1852-3 to 1891-2.
11. Barley, produce per acre; 11 courses.	40. Table showing the Rainfall; also the amount of Percolation through Drain Gages, containing respectively, 20 inches, 40 inches, and 60 inches depths of Unmanured, and Uncropped Soil and Subsoil, in natural state of consolidation—22 harvest-years, 1870-1 to 1891-2.
12. Clover or Beans, produce per acre; 11 courses.	41. Table showing the loss of Nitrogen (as Nitrates), respectively through 20 inches, 40 inches, and 60 inches depth of Soil and Subsoil, also the loss of Nitrogen calculated as Nitrate of Soda—15 harvest-years, 1877-8 to 1891-2.
13. Wheat, produce per acre; 11 courses.	42. Table showing the amounts of Nitrogen supplied in Manure, and estimated to be recovered in Increase of Crop, lost in Drainage, accumulated as Crop-Residue in the surface-soil, and not so accounted for, in the case of differently matured Wheat plots—averages per acre per annum for 30 harvest-years, 1851-2 to 1880-1.
14. Average produce, and yield of Nitrogen per acre per annum; 8 courses.	43. Table illustrating the loss of Nitrogen as Nitrate, in a wet autumn and winter, in the drainage from the differently manured Wheat plots in Broadbalk-field; also the loss calculated as Nitrate of Soda; Season 1891-2, 49th year of the Wheat experiments.
15. Photographs of Roots (Swedish Turnips), grown in Rotation without Manure, with Mineral Manure, and with Mineral and Nitrogenous Manure.	44. Colored diagrams illustrating the results of experiments on the Feeding of Animals; showing the proportion of Nitrogenous, of Non-Nitrogenous, and of Total Organic Substance consumed:—I. Per 100 lb. live-weight per week. II. To produce 100 lb. increase in live-weight.
Photographs of various Leguminous Plants, grown in experiments on the Fixation of Free Nitrogen:	.....Each, Duty Free 2.25
Peas, Vetches, and Yellow Lupins; grown in pots.	.....Each, Duty Free .50
16. Peas, grown in pots.	12. Diagonal trained Pear in fruit.
17. Peas, grown in pots.	13. Horizontal trained Pear tree.
18. Sainfoin; grown in pots.	14. Fan trained Plum.
19. Table of results relating to Nos. 17 and 18.	15. Upright trained Apple, 5 branches.
Tables of results of experiments on the Growth of Potatoes for many years in succession on the same land, commencing 1876:	16. Pyramid Apple trees in fruit in pots.
21. Manures, and Produce per acre (Sound and Diseased).	17. Standard Apple, 3 years old.
22. Specific Gravity, and Percentage Composition of Sound Tubers.	18. Standard Pear, 3 years old.
Tables of results of experiments on the Mixed Herbage of Permanent Grass for many years in succession on the same land, commencing 1856:	19. Standard Plum, 3 years old.
23. Manures, and Produce (as Hay), per acre per annum.	20. Peach trees, one year, pruned; and two years after pruning.
24. Botanical Composition of the Herbage.	21. Pyramid Peach grown in pot, 20 years old, with 120 peaches on it.
25. Summary of the Botanical Composition, per cent., per acre, etc.	22. Half Standard Peach.
26. Summary of the Chemical Composition of the Produce, per acre.	23. Bush Peach in fruit.
27. Table of results of experiments on Wheat grown in alternation with Fallow, and Wheat grown year after year continuously, without Manure—42 years, 1850-1 to 1891-2.	.....Each, Duty Free 2.25
<b>A2541. Same as No. A2540, but colored.....</b>	.....Each, Duty Free .50
<b>A2550. FRUIT TREE CULTIVATION.</b>	
1. Grafting; Stock, Graft, Graft cut, Graft inserted in Stock.	12. Diagonal trained Pear in fruit.
2. Budding; Stock, Bud cut for inserting, Bud inserted, Bud tied in.	13. Horizontal trained Pear tree.
3. Pruning a Pyramid Pear Tree.	14. Fan trained Plum.
4. Maiden Cherry, 1 year old.	15. Upright trained Apple, 5 branches.
5. Maiden Plum, 2 years old.	16. Pyramid Apple trees in fruit in pots.
6. Maiden Pear Tree.	17. Standard Apple, 3 years old.
7. Pyramid Pear.	18. Standard Pear, 3 years old.
8. Pyramid Pear in fruit in pot.	19. Standard Plum, 3 years old.
9. Pyramid Pears "Conference" and "Pitmster Duchess."	20. Peach trees, one year, pruned; and two years after pruning.
10. Bush Pear in fruit.	21. Pyramid Peach grown in pot, 20 years old, with 120 peaches on it.
11. Goblet-shaped Pear Tree in fruit.	22. Half Standard Peach.
<b>A2551. Same as No. A2550, but colored.....</b>	23. Bush Peach in fruit.
<b>A2560. NITRIFYING ORGANISMS IN SOILS.</b>	.....Each, Duty Free .50
1. Nitrous organism in soil from Zurich (Zoogloë stage) $\times 1,000$ .	6. Nitrous organism in soil from Kazan, Russia, $\times 1,000$ .
2. Nitrous organism in soil from Zurich (Zoogloë stage) $\times 1,000$ .	7. Nitrous organism in soil from Gennevilliers (grown on jelly) $\times 1,000$ .
3. Nitrous organism in soil from Zurich (Mobile stage) $\times 1,000$ .	8. Nitrous organism in soil from Quito, Coccus, $\times 1,000$ .
4. Nitrous organism in soil from Java $\times 1,000$ .	9. Nitric organism in soil from Quito $\times 1,000$ .
5. Nitrous organism in soil from Java (Mobile stage) $\times 1,000$ .	10. Nitric organism in soil from St. Petersburg.
	11. Nitric organism in soil from Bonn.

## SLIDES, LANTERN—Continued

**A2570. EFFECTS OF MANURES.** Made from a series of photographs of actual specimens grown with various manures, and mostly contain from four to eight samples on each slide. .... **Each, Duty Free \$0.50**

1. Wheat. Experiment with and without Nitrogenous Manures.
2. Barley. Experiment with and without Nitrogenous Manures.
3. Peas. Experiment with and without Nitrogenous Manures.
4. Oats. Experiment with and without Nitrogenous Manures.
5. Oats. Experiments with Green Manures.
6. Peas and Oats. Experiments with and without Potash, Phosphoric Acid, and Nitrogen, for comparison.
7. Vetches. Experiments with and without Potash, Phosphoric Acid, and Nitrogen.
8. Peas and Wheat. Yield of experiments with and without various Manures.
9. Summer Rye. Experiments with and without Superphosphate, in autumn and spring.
10. Summer Rye. Experiments with and without Phosphate powder, in autumn and spring.
11. Barley. Experiments with and without Superphosphate and Phosphate Powder.
12. Barley. Yield of experiments shown in Slide No. 11.
13. Barley. Manurial experiments on Loamy Soil: (1) Without Phosphoric Acid; (2) with Phosphoric Acid as Superphosphate; (3) with Phosphoric Acid as finely pulverized Thomas' Phosphate.
14. Buckwheat and Peas. Experiments with Phosphoric Acid and Potash.
15. Oats. Green Manuring experiments.
16. Oats. Yield of experiments with and without Green Manures.
17. Oats. Illustrating the influence of Phosphatic Manuring on the utilization of Nitrate Nitrogen.
18. Oats. Experiments with and without Phosphoric Acid in different forms.
19. Experiments with and without Superphosphate.
20. Crop of Oats. Yield of experiments with various manures on (1) Clay Soil; (2) Soil rich in Humus.
21. Crop of Oats and Barley. Yield of experiments with and without Phosphoric Acid on Clay Soil.
22. Vetches and Wheat. Yield of experiments with and without Potash, Phosphoric Acid, and Nitrogen.
23. Wheat. Experiments with (1) No Manure; (2) Potash and Phosphoric Acid; (3) Potash, Phosphoric Acid and Nitrogen.
24. Maize. Manurial experiments with Phosphoric Acid, Potash, and in addition, Nitrogen as Nitrate of Soda.
25. Hemp. Manurial experiments as in No. 24.
26. Tobacco. Manurial experiments with Nitrogen and Superphosphate, and Nitrogen and Phosphate of Potash.
27. Beetroot. Manurial experiments as in No. 24.
28. Carrots. Manurial experiments as in No. 24.
29. Carrots, as above, showing roots.
30. Field Beans. Manurial experiments as in No. 24.
31. Peas. Manurial experiments as in No. 24.
32. Potatoes. Manurial experiments as in No. 24.
33. Clover. Experiments with and without Phosphoric Acid in form of Superphosphate and Thomas' Phosphate Powder.
34. Fuchsias. Manurial experiments in Hot-bed Soil.
35. Geraniums. Manurial experiments in Hot-bed Soil.

**A2571. Same as No. A2570, but colored.....** **Each, Duty Free 2.25**

**A2580. THE EMBRYOLOGY OF A CHICKEN.** A unique series of Lantern Slides from direct negatives by Mr. W. M. Martin, of Redruth, comprising the complete history of the development of the germ from the time the egg is laid to the hatching of the chicken. .... **Each, Duty Free .70**

1. A Fresh Laid Egg.
2. A Fresh Laid Egg showing air space at broad end.
3. A Fresh Laid Egg carefully opened, showing circular germ which develops into the chicken.
4. Fresh Laid Egg opened and yolk turned upside down to show the twisted ends of membrane which keep the germ uppermost.
5. Appearance of Germ after 12 hours' incubation, concentric circles appearing.
6. Germ after 24 hours' incubation.
7. Appearance after two days.
8. Appearance on 3rd day.
9. Appearance on 4th day.
10. Showing effect of raising the temperature of incubator from 103 degrees (normal) to 120 degrees for 10 hours on 4th day.
11. 5th day.
12. A portion of No. 11 enlarged.
13. Embryo on 5th day dissected from the yolk.
14. Appearance on removing portion of shell on 5th day.
15. Embryo of No. 14 removed from shell and slightly magnified, showing rudimentary limbs.
16. 6th day.
17. Embryo of No. 16, dissected from the yolk and magnified.
18. 7th day.
19. Embryo of No. 18 removed from shell.
20. No. 19 enlarged.
21. Empty shell on 7th day.
22. 8th day.
23. 9th day.
24. Entire contents of shell removed on 9th day.
25. 9th day—removed from shell, showing first formation of beak.
26. Showing the effect of temperature of 120 degrees on 9th day for several hours.
27. 10th day.
28. 11th day—portion of covering membrane removed.
29. 11th day—shell opened near broad end of egg, and covering membrane removed.
30. 11th day—removed from shell and covering membrane, showing growth of limbs and beak.
31. 11th day—contents of shell removed, yolk perforated and contents withdrawn.
32. 11th day—removed from shell and slightly enlarged, showing growth of beak and body.
33. 11th day—contents of shell removed and chicken placed in position to show two well-formed curves in main artery.
34. 11th day—showing well-expanded air space.
35. 12th day—showing appearance of membrane and blood vessels.
36. 12th day—covering membrane removed.
37. 12th day—removed from shell.
38. 12th day—entire contents of shell removed, showing white of egg being absorbed by yolk.
39. 13th day—appearance of covering membrane.
40. 13th day—with membrane removed.
41. 14th day—appearance on removing shell.
42. 14th day—removed from shell.
43. 15th day—appearance of covering membrane.
44. 15th day—covering membrane removed.
45. 15th day—removed from shell.
46. 16th day—membrane removed.
47. 16th day—opened from opposite side of shell.
48. 16th day—entire contents of shell removed.
49. 17th day—portion of membrane removed.
50. 17th day—membrane removed.
51. 17th day—entire contents of shell removed.
52. 17th day—showing chicken with swollen neck, head in wrong position, and dead.
53. Showing No. 52 from other side, with yolk removed.
54. 17th day—removed from shell.
55. 18th day—showing head of chicken almost in position for hatching.
56. 19th day—showing chicken in correct position for hatching.
57. 19th day—removed from shell.
58. 19th day—showing large amount of yolk still unabsorbed.
59. No. 58 removed from shell in its natural position.
60. 20th day—removed from shell.
61. 20th day—showing still unabsorbed yolk.
62. 20th day—shell opened opposite side from No. 61.
63. 21st day—shell carefully peeled off.
64. Showing position assumed by No. 63 on cutting the binding cords.
65. 21st day—removed from shell.
66. End of air space opened on 21st day.
67. Coming through the shell.
68. Five hours later.
69. A snap shot one hour later.
70. Chicken twelve hours after hatching.

**SLIDES, LANTERN—Continued**

A2590. VETERINARY SCIENCE ..... Each, Duty Free \$0.50

**VETERINARY ANATOMY**

1. Skeleton of Horse.
2. Skeleton of Cow.
3. Skeleton of Sheep.
4. Skeleton of Dog.
5. Skeleton of Pig.
6. Lateral view of Horse's Skull.
7. Right Fore-foot of Horse.
8. Left Hind-foot of Horse, external aspect.
9. External Muscles of Right Anterior Limb of Horse.
10. Larynx of Horse.
11. Bronchial Tubes of Horse.
12. Kidneys of Ox.
13. Heart and Principal Vessels of Horse; left face.
14. Heart and Principal Vessels of Horse; right face.
15. Stomach of Horse.
16. Stomach of Ox.
17. Intestines of Horse, general view.
18. Roots of Jugular Vein in Horse.
19. Median and Vertical Section of Horse's Brain.
20. Nerves of Digit.

**BACTERIOLOGY**

21. Healthy Blood. Red and White Corpuscles.
22. Involution form of *Bacillus Anthracis* (Agar Cultivation).
23. Spore-formation of *Bacillus Anthracis* (Potato Culture).
24. *Bacillus of Tetanus* (Culture).
25. Tuberculosis (Intestinal Ulcers in a Tubercular Cow).
26. Tuberculosis. (Lungs of Rabbit inoculated with milk from a Tubercular Cow).
27. Actinomyces.
28. Actinomycosis ("Lumpy Jaw").
29. A Specimen of the Glanders *Bacillus*.

**PARASITES**

30. Spiropters and Larvae of Oestrus in Stomach of Horse.
31. Larvae and Pupa of *Gastrophilus Equi*.
32. Male and Female of *Gastrophilus Equi*.
33. *Taenia Perfoliata* of Horse; Cephalic extremity of *Taenia Perfoliata*.
34. *Taenia Mamillana*; Cephalic extremity of same. *Taenia plicata* of Horse.
35. *Taenia Expansa* of Ox; Cephalic extremity.
36. *Taenia Marginata* of Dog, and Hooks of same.
37. *Taenia Coenurus* of Dog, and Hooks of same.
38. *Taenia Echinococcus* and Hooks of same.
39. *Ascaris Lumbricoides*; lateral view and ventral surface, Male and Female.
40. *Oxyuris Curvula* of Horse, Male and Female.
41. Fragments of the Coecum of Horse, showing Tumors due to Sclerostones and Parasites.
42. Cephalic extremity of *Strongylus Contortus* of Sheep. Caudal extremity of the Male Phagostoma Venulosum.
43. *Trichina Spirales* of Pig.

A2596. DISEASES AND PARASITES OF CATTLE ..... Each, Duty Free .50

1. Warbles in Ox, *Hypoderma Bovis*, female, Larva from tumor, Genital Apparatus, Eggs, etc.
2. Bot in the Horse, *Gastrophilus Equi*. Bots attached to stomach, eggs on hairs, and adult fly.
3. Mange in the Horse, *Psoroptes Communis Equi*, Male.
4. Mange in the Horse, Male and Female.
5. Mange in the Dog, *Demodex Folliculorum*.
6. Itch in Man, Sarcoptes Scabiei, Male and Female.
7. Scab in Sheep, *Psoroptes Longirostris Var. Ovis*.
8. Lice of Pig.
9. Lice of Horse.
10. Lice (sucking) of Ox, *Haematopinus Curysternus*.
11. Lice (biting), *Trichodectes Scalaris*, with allied form from Magpie for comparison.

**EXTERNAL PARASITES OR ECTOZOA**

44. *Haematopinus Macrocephalus* of Horse (Female).
45. *Haematopinus Eurysternus* of Ox (Female).
46. *Haematopinus Tenuirostris* of Ox (Female). *Trichodectes Scalaris* of Ox (Female).
47. *Trichodectes Sphaerocephalus* of Sheep (Female). *Melophagus* of Sheep.
48. *Ixodes Ricinus* of Dog.
49. *Psoroptes Communis Equi*, Male.
50. *The Mange Acarus* of Sheep.
51. Dog, affected with advanced Demodectic Scabies.

**OBSTETRICS**

51. Vertebro-sacral position of Foetus (Cow).
52. Anterior Presentation: Fore limb crossed over the neck.
53. Anterior Presentation: One fore limb completely retained.
54. Anterior Presentation: Fore limbs bent at the knees.
55. Anterior Presentation: Both fore limbs completely retained.
56. Anterior Presentation: Extreme downward deviation of the head.
57. Anterior Presentation: Lateral deviation of the head towards the shoulder.
58. Anterior Presentation: Lateral deviation of the head towards the abdomen.
59. Anterior Presentation: Deviation of the head upwards and backwards.
60. Lumbo-sacral Position.
61. Hock Presentation: Hock corded.
62. Thigh and Croup Presentation.
63. Sterno-abdominal Presentation. Head Retained: Calf.
64. Baron's Obstetric Machine.

**VETERINARY SURGERY**

65. Post Travis.
66. Casting—rope applied.
67. English method of throwing down a horse with hobbles.
68. Operating Table: Vertical Position.
69. (1) Alsace Nose-ring and Head-stall.  
(2) Alsace Nose-ring applied.
70. Securing hind leg by means of tail; Ox Travis.
71. (1) Single Pin Suture; (2) Quilled Suture; (3) Dossiled Suture; (4) Zigzag Suture.
72. Horse in Slings.
73. (1) Apparatus for Fractured Scapula.  
(2) Apparatus Applied to the Shoulder.  
(3) Iron Splint for Fracture of Bones of the Fore Limb.  
(4) Iron Splint Applied.
74. The Various Arrangements of Cautery Lines.
75. (1) Inside of Hock with Cunean Tendon exposed.  
(2) Same raised for division.

12. Tick from Sheep, *Ixodes Ricinus*.
13. Tick from Dog, *Ixodes Ricinus*.
14. Tick or Ked from Sheep, *Melophagus Ovinous*.
15. Brain of Sheep with Polycephalous Hydatid of *Taenia Caenurus*.
16. Tape Worm of Dog, *Taenia Marginata*, in Bladder Cyst from Sheep.
17. Tape Worm of Dog, *Taenia Marginata*.
18. *Trichina Spiralis*, a piece of infested flesh.
19. Liver Fluke of Sheep, *Distomum Haepaticum*.
20. The Snail the Fluke inhabits, *Limnaca Truncatula* and embryo of *D. Haepaticum*.
21. Autumn Breeze Fly, *Tabanus Bovis*, magnified head and mouth organs.
22. Common Symbiot, *Symbiotes Communis*, found on Horse, Ox, Goat, Sheep, and Rabbit.

## SLIDES, BOTANICAL LANTERN

From Photomicrographs of Actual Preparations.

(Copyright, 1903, by Wm. H. Knapp.)

The following twenty-five lantern slides were made from actual mounted preparations selected with the utmost care to show all the structures in the various groups of plants as they are now presented in the best school courses in botany. Their superiority over slides made from book illustrations, drawings, etc., is at once apparent. The various plant structures appear upon the screen as they actually are in the mounted preparation, and from them the student can get much help in interpreting his own work. They are of invaluable aid to the live teacher, who, by their use, can convey the right idea of plant structures to an entire class instead of to each student separately. Credit is due to Dr. Chas. J. Chamberlain and Mr. W. J. G. Land of the University of Chicago; to Dr. Chamberlain for suggestions, the description and the use of splendid preparations; to Mr. Land for many fine micro slides.

1. **Spirogyra.** A very complete series, showing all stages in zygosporic reproduction, from the scarcely altered vegetable cells up to the mature zyospore. Many of the more usual peculiarities in the formation of zygospores are also shown.
2. **Diatoms.** A beautiful slide of Mobile Bay diatoms, showing Navicula, Triceratium, Coccinodiscus, and other forms.
3. **Mucor stolonifer.** Mycelium and several stages of zygosporic reproduction.
4. **Puccinia graminis.** The Rust of Wheat and Oats; a section of Barberry leaf, showing the aecidium (cluster cup) stage.
5. **Coprinus comatus.** Shaggy Mane Mushroom; a transverse section of the gills, showing trama, basidia with sterigmata and spores, and also the paraphyses.
6. **Bryum proliferum.** Moss; longitudinal section, showing archegonia and paraphyses. The egg (oosphere) and ventral canal cell are clearly shown.
7. **Polytrichum commune.** Moss; longitudinal section, showing numerous antheridia.
8. **Byrum proliferum.** Moss; three longitudinal sections of the entire capsule and part of the seta, showing columella, spore tissue, air chambers, annulus, peristome, and operculum.
9. **Marchantia polymorpha.** Longitudinal section of antheridiophore, showing antheridia in various stages.
10. **Marchantia polymorpha.** Longitudinal section of archegoniphore, showing archegonia.
11. **Pteris aquilina.** The Bracken Fern; traverse section of the rhizome. The various tissues and even the cells are sharply differentiated.
12. **Pteris cretica.** The entire male prothallium, showing antheridia and rhizoids.
13. **Pteris cretica.** Longitudinal section of the female prothallium, showing archegonium with the egg (oosphere) ventral canal cell and neck canal cells. The vegetative cells show nuclei and chlorophyll granules.
14. **Pteris cretica.** Transverse section of a leaf, showing sporangia in various stages of development. The annulus and spores are particularly clear. The "false indusium" and the structure of the leaf are also shown.
15. **Pinus laricio.** Austrian Pine; longitudinal section of ovule, containing female gametophyte with archegonia. A pollen tube is shown in the nucellus and the seed coats are beginning to appear.
16. **Pinus banksiana.** Longitudinal and transverse sections of a 4-year-old stem, showing pith, cortex, xylem, phloem, annual rings, medullary rays, resin ducts, etc.
17. **Lilium tigrinum.** Transverse section of nearly ripe anther. Two pollen sacs, each formed by the breaking down of the wall between a pair of microsporangia, are very clear. The stomium, endothelial layer, and pollen grains are extremely sharp, even the tube nuclei and generative nuclei of the individual pollen grains appearing on the screen.
18. **Lilium canadense.** Transverse section of the ovary. The ovules show funiculus, integuments, nucellus, and embryo sac.
19. **Smilax herbacea.** Transverse section of the root, showing xylem, phloem, endodermis, etc.
20. **Zea mays.** Indian Corn; transverse section of stem, showing typical monocotyl stem structure.
21. **Ruta graveolens.** Rue; transverse section of a leaf, showing epidermis, palisade, spongy parenchyma, crystals, oil glands, etc.
22. **Capsella bursa-pastoris.** Shepherd's Purse; longitudinal section of entire seed, showing the dicotyledonous embryo with complete suspensor, endosperm, micropyle, beginning of seed coats, etc. This slide, if explained by a competent teacher, is worth the price of the whole collection.
23. **Xanthium canadense.** Cockle Burr, transverse section of stem, showing typical structure of a dicotyledonous herb.
24. **Tilia americana.** Basswood; transverse and longitudinal sections of a 2-year-old stem, showing typical structure of a woody dicotyledon.
25. **Brasenia peltata.** Transverse section of stem, showing large air spaces, and the characteristic reduction of vascular tissue found in water plants.

A2600. Each .....	\$0.60
A2601. Complete Set, as above described, in strong carrying case.....	13.50

## SLIDES, MICROSCOPE

### PREPARED FOR USE

The slides listed in this section have been carefully selected to meet the needs of teachers of Agriculture, Bacteriology, Botany, Physiology and Zoology, for demonstration material to use in connection with elementary courses in those subjects. They have been chosen from a long list of slides as those best adapted to illustrate the types usually emphasized and are sufficient in number to cover quite well the range of material included in elementary work.

These slides are of the highest quality, being made for us under the supervision of men of wide experience in slide making. Each slide listed is selected because it shows plainly those characteristics which it is intended to illustrate; all other slides are rejected. They are equally well adapted for university, college or high school work and have been used very satisfactorily in pre-medical courses.

### No. A2650. BACTERIOLOGY SLIDES

#### Non-Pathogenic Preparations

1. <i>Bacillus Acidilactici</i> , causes souring of milk-----	\$0.70	4. <i>Azotobacter</i> , a very large nitrogen fixing bacterium-----	.70
2. <i>Bacillus Prodigiosus</i> , a common form floating free in the air. Has a red color-----	.70	5. <i>Bacillus Subtilis</i> , the hay bacillus-----	.70
3. <i>Bacillus Radicicola</i> , nitrogen fixing bacteria from clover nodules-----	.70	6. <i>Saccharomyces</i> , brewers' yeast-----	.70
		7. <i>Bacillus Violaceus</i> , common in water-----	.70
		8. <i>Sarcina Lutea</i> , from the air-----	.70

#### Pathogenic Bacteria

The following list of disease-producing bacteria includes all of the more common forms and many which, though not common, are of great interest to science. They are all grown in pure culture and mounted and stained in the very best manner. They all allow for work with the oil immersion lens.

9. <i>Actinomyces</i> , cause of lumpy jaw in cattle and man-----	.70	27. <i>Bacillus Typhosis</i> , typhoid fever-----	.70
10. <i>Bacillus Anthracis</i> , anthrax or splenic fever-----	.70	28. <i>Bacillus Welchii</i> , gas bacillus. Cause of many complications in the healing of wounds-----	.70
11. <i>Bacillus Avisepticus</i> , chicken cholera-----	.70	29. <i>Blastomycetes</i> , a pathogenic yeast. Cause of skin infections-----	.70
12. <i>Bacillus of Bordet-Gengou</i> , whooping cough-----	.70	30. <i>Meningococcus Intracellularis</i> , causes meningitis-----	.70
13. <i>Bacillus Coli-Communis</i> , very common. Normally in large intestine-----	.70	31. <i>Micrococcus Gonorrhoeae</i> , pure culture. Cause of gonorrhoea-----	.70
14. <i>Bacillus Diphtheriae</i> , cause of diphtheria-----	.70	32. <i>Micrococcus Gonorrhoeae</i> , from pus of the sore-----	.70
15. <i>Bacillus Dysenteriae</i> , cause of dysentery-----	.70	33. <i>Pneumococcus</i> , pneumonia, pure culture preparation-----	.70
16. <i>Bacillus Enteriditis</i> , meat poisoning-----	.70	34. <i>Pneumococcus</i> from sputum-----	.70
17. <i>Bacillus Influenza</i> , the influenza bacillus-----	.70	35. <i>Spirillum Cholerae</i> , comma bacillus. Asiatic cholera-----	.70
18. <i>Bacillus of Malignant Oedema</i> -----	.70	36. <i>Spirillum Metchnikovii</i> , chicken cholera-----	.70
19. <i>Bacillus Mallei</i> , glanders, a disease of the horse-----	.70	37. <i>Staphylococcus</i> , boils and other skin eruptions-----	.70
20. <i>Bacillus Para-Typhoid</i> , relation to typhoid fever not clear-----	.70	38. <i>Streptococcus Erysipelatis</i> , cause of erysipelas in man-----	.70
21. <i>Bacillus Pestis</i> , bubonic plague-----	.70	39. <i>Streptococcus Pyogenes</i> , from suppurative processes-----	.70
22. <i>Bacillus Pyocyaneus</i> , from blue or green pus, causes gangrenous conditions-----	.70		
23. <i>Bacillus of Rhinoscleroma</i> , a nose infection in man-----	.70		
24. <i>Bacillus Suisepiticus</i> , swine plague-----	.70		
25. <i>Bacillus Tetani</i> , lockjaw-----	.70		
26. <i>Bacillus Tuberculosis</i> , from human-----	.70		

#### Special Preparations

40. <i>Bacillus Typhosus</i> , flagella stain-----	1.50	43. <i>Treponema Pallidum</i> , cause of syphilis. Section of tissue showing the germs in situ-----	1.50
41. <i>Bacillus Subtilis</i> , hay bacillus, spore stain-----	1.50	44. <i>Bacteroids of Radicicola</i> , in nodules of legumes-----	1.50
42. <i>Bacillus Proteus Vulgaris</i> , from soil, flagella stain-----	1.50		

In ordering, kindly give full name of slides desired to avoid confusion.

**No. A2660. BOTANY SLIDES****ALGAE**

1. Oscillatoria, a simple filamentous blue-green alga ..... \$0.35
2. Nostoc, one of the commonest of algae. Shows development by heterocysts ..... .35
3. Volvox, the best type of colonial algae. The slide shows sexual stages as well as vegetative ..... .40
- \*4. Diatoms, numerous species on each slide ..... .35
5. Desmids, vegetative stages ..... .35
- \*6. Spirogyra, vegetative and conjugating. This form is excellent as an example illustrating the origin and differentiation of sexual reproduction ..... .35
- \*7. Vaucheria, a multinucleate, branching, green alga. The curious sexual reproduction is of great interest ..... .35
8. Chara, branches with sex organs, mounted entire. This form indicates the highest type of development of our fresh water green algae ..... .35
9. Fucus, sections of oogonial conceptacles showing eggs, etc. This is our most familiar type of brown alga from the ocean ..... .40
10. Fucus, sections of antheridial conceptacles showing spermatozoa, etc ..... .40

**FUNGI**

- \*11. Yeast, showing the peculiar type of reproduction known as budding ..... .40
- \*12. Mucor, bread mould; an excellent type to show the conjugative type of reproduction in fungi. Shows spores also ..... .35
13. Wheat Rust, the fungus that causes enormous damage each year to wheat and other domestic grasses.
  - a. Slide showing aecidial stage occurring on barberry or some such widely different plant ..... .40
  - \*b. Uredospore stage, red rust as found on oats or wheat. One slide ..... .40
  - c. Telutospore stage, the black rust on wheat. One slide ..... .40
- \*14. Coprinus (mushroom), section showing the club shaped basidio-spores as they develop on the gills of this fungus ..... .40

**LICHENS**

15. Lichen, section through the thallus showing the symbiotic relationship of the fungus and the alga ..... .40
16. Lichen, section through the fruiting cup. Shows the fruiting arrangement, the spores, etc. ..... .40

**BEYOPHYTES**

17. Marchantia, section through the thallus showing the large air spaces, the chlorophyll tissue, etc. ..... .40
- \*18. Marchantia, section through the antheridial head showing the location of the male reproductive cells ..... .40
- \*19. Marchantia, section of archegonial head showing the long necked archegonia with the eggs at the base ..... .40
20. Marchantia, longitudinal section of sporophyte growing from the fertilized egg ..... .40
- \*21. Moss, section of antheridial head ..... .40
- \*22. Moss, section of archegonial head ..... .40
23. Moss, longitudinal section of sporophyte showing the development of the sporogenous tissue ..... .40

**PTERIDOPHYTES**

24. Selaginella, longitudinal section of the cone showing the spores, etc. ..... .50
25. Equisetum, the common horse-tail. Longitudinal section of the strobilus showing sporogenous tissue and spores ..... .50
- \*26. Fern (Pteris), cross section of rhizome. This shows the polystele type of tissue arrangement in an underground stem ..... .35
- \*27. Fern, cross section of the leaf showing the arrangement of the sporangia in the folded-over edge ..... .40
- \*28. Fern, prothallia mounted whole; young and old stages ..... .40
- \*29. Fern, prothallium sectioned to show antheridia ..... .50
- \*30. Fern, section to show archegonia ..... .50

**GYMNOSPERMS**

- \*31. Pine Stem, cross and longitudinal sections showing arrangement of ducts and fibers ..... .35
32. Pine Leaf, cross section. This is a cross section of the pine needle and illustrates adaptation to prevent loss of water ..... .35
33. Pine Cone, longitudinal section of staminate cone showing the pollen ..... .40

**ANGIOSPERMS**

## (Stems)

34. Geranium Stem, cross section. A good illustration of the endarch siphonostele ..... .35
35. Pumpkin Stem, cross and longitudinal sections of stem. Shows sieve tubes and sieve plates ..... .35
- \*36. Water Lily, cross section of petiole showing the reduced vascular system of water plants ..... .35
- \*37. Corn, cross section of stem. The typical monocotyle stem ..... .35

## (Roots)

38. Ranunculus Root, cross section. This is a typical root ..... .35
39. Root, longitudinal section of young root showing nucleated root hair cells ..... .40
- \*40. Smilax, cross section. Shows prominent endodermis ..... .35
- \*41. Onion Root, longitudinal section of root tip showing the different stages of mitosis ..... .50

## (Leaves)

42. Lily Leaf, showing the arrangement of the tissues in a parallel veined leaf ..... .35
43. Rubber Plant Leaf, showing palisade cells and cystoliths ..... .35
- \*44. Lilac Leaf, the best leaf to show the arrangement of cells and tissues in what might be called a typical leaf ..... .35
45. Leaf Epidermis, mounted flat to show the stomata ..... .35

## (Flowers)

46. Dandelion Flower, longitudinal section. Shows the arrangement of the composite flower ..... .50
47. Lily Flower Bud, cross section. Shows the typical floral diagram that is figured in text books ..... .50

## (Reproductive Organs)

- \*48. Lily Stamen, cross section. Shows pollen grains in the cavity of the anther ..... .40
- \*49. Lily Ovary, cross section. Shows germination of the megasporangium and typical ovule ..... .40
- \*50. Capsella Embryos. Horizontal section of the seed pod showing the embryos in position and in various stages of development ..... .40

A2661. COMPLETE SET OF 25 SLIDES marked with asterisk (\*), in wooden slide box..... 9.00

In ordering, kindly give full name of slides desired to avoid confusion.

## No. A2670. PHYSIOLOGY AND HISTOLOGY SLIDES

*1. Blood of Frog, showing large nuclei and many leucocytes.....	\$0.35	22. Scalp, section of scalp of white man showing the imbedded hairs, glands, etc.....	.40
*2. Blood of Human, no nuclei. Many white blood corpuscles .....	.35	*23. Skin, section of skin of white man showing the coiled sweat glands, the different epidermal layers, etc. ....	.40
*3. Bone, cross section; shows Haversian canals, canaliculi, etc. ....	.40	24. Skin of Negro, sectioned; shows the prominent pigment layer and the other structures .....	.40
*4. Bone, longitudinal section; shows systems from another view.....	.40	*25. Nerve Cells, cross section of a peripheral nerve showing the neurilemma, the medullated layer and the axones.....	.40
*5. Cartilage, hyaline, illustrating the type of cartilage that develops into bone.....	.35	*26. Spinal Cord, cross section showing the peripheral white matter, the central gray matter with the large motor cells and their extensions .....	.40
*6. Cartilage, elastic. This is the type of cartilage that does not form bone. The epiglottis is composed of this type.....	.35	*27. Retina of Eye, showing the different coats .....	.50
*7. Muscle, striated, showing cross striations and nuclei .....	.35	*28. Cerebrum, stained to bring out the contrast between the white and the gray matter .....	.40
*8. Muscle, heart muscle, showing the curiously twisted fibers, etc. .....	.35	*29. Cerebellum, showing the curious structure .....	.35
9. Muscle, smooth muscle, from the alimentary canal. Teased out and mounted.....	.35	30. Testis, sectioned and stained to show location and development of the spermatozoa .....	.40
10. Oesophagus, cross section, shows the stratified epithelium which is so different from that found in the stomach.....	.40	31. Ovary, cross section which shows eggs in many stages of development.....	.40
*11. Stomach, section of cardiac end, showing the cells which secrete the hydrochloric acid .....	.40	32. Ligamentum Nuchae, a typical tendinous ligament .....	.35
12. Stomach, section of pyloric end, showing the widely different secretory cells occurring here .....	.40	33. Connective Tissue, showing the loose structure of this tissue with its scattered nuclei .....	.35
*13. Intestine, small, injected to show the ducts running into the villi.....	.40	*34. Adipose Tissue, prepared so that the cells are still filled with the oily fat.....	.40
*14. Villi, a special preparation to bring out individual villi .....	.40	*35. Epithelial Cells, flat mount showing the hexagonal shape of the squamous epithelial cells with their central nuclei.....	.35
*15. Intestine, large, stained to show the secreting glands and the layers of tissue.....	.35	*36. Artery and Vein, cross section of a vein and an artery as they run side by side in the body.....	.40
*16. Liver, preparation stained to bring out the large hexagonal cells with their correspondingly large nuclei.....	.35	*37. Tongue, section which shows the taste buds, the muscle layers and the secreting glands .....	.35
17. Liver, injected to show the bile ducts.....	.50	38. Spleen, section showing the interesting structure of this organ whose function in the body is not known.....	.35
*18. Pancreas, showing the Island of Langerhans, etc. .....	.35	39. Kidney, injected, showing convoluted tubules and Bowman's capsules.....	.35
*19. Lung, sectioned and stained to show the very loose structure with the arteries and veins running through it.....	.40	40. Thyroid Gland, colloidal substance, etc.....	.50
*20. Sub-Maxillary Gland. A beautiful illustration of glandular tissue.....	.40		
21. Mammary Gland, a different type of gland .....	.35		
A2671. COMPLETE SET OF 25 SLIDES marked with asterisk (*), in wooden slide box.....			9.00

In ordering, kindly give full name of slides desired to avoid confusion.

## No. A2680. PLANT PATHOLOGY AND AGRICULTURE SLIDES

### Typical Plants and Their Pathological Conditions

1. **Wheat Starch Granules.** There are two kinds of granules on this slide. The one is the starch as it is found in the grain; the other as the starch appears after the grain has begun to sprout. It shows that the granule is dissolved in spots by the action of the enzyme in the sprouting grain.
2. **Cross Section of Bean Leaf** (*Phaseolus vulgaris*). This slide shows the structure of a typical leaf. It shows the upper and lower epidermis, with stomata, and between them the palisade and spongy parenchyma, showing intercellular spaces, passages and substomatal chambers.
3. **Bean Root Tubercles** (*Pseudomonas radicicola*). This slide shows the root nodules in which are seen the bacteria which store up nitrogen from the air in the form of nitrates. These organisms are found on the roots of all leguminous plants, like peas, beans, clover, alfalfa, etc.
4. **Cross Section of Carnation Leaf** (*Dianthus caryophyllus*). This slide shows a section of a leaf with a thick cuticle and the stomata sunk in pits, two means of preventing excessive evaporation of water from the leaf.
5. **Cross Section of Mushroom** (*Coprinus micaceus*). This section shows the pileus, the trama, the hymenium and the spores, many of them still attached to the sterigmata.
6. **Stem of Yellow Water Lily** (*Nymphaea advena*). This slide shows the large air passages in the stem of a water-plant and such other points wherein it differs from the dry land plant.
7. **Clover Dodder** (*Cuscuta trifoliae*). This shows one of the semi-parasitic plants growing on another plant. It shows the parasite with a weakly developed vascular system, become so through lack of use. It also illustrates very nicely the haustoria or suckers entering the phloem (food conducting tissue) of the clover.
8. **Apple Bitter Rot** (*Glomerella rufomaculans*). This shows the typical pustules produced on the apple by this fungus. It shows the large number of small spores produced in each pustule.
9. **Apple Black Rot** (*Sphaeropsis malorum*). This shows the action by another fungus producing disease on the apple.
10. **Apple Scab** (*Venturia pomii*). This is a section of the common scab on an apple. It shows what ordinary observation does not reveal—that the diseased area is covered with a mass of conidiophores like the pile on velvet.
11. **Blackberry Canker** (*Nectria cinnabarina*). A good mount is needed to illustrate this type of canker.
12. **Blackberry Leaf Spot** (*Septoria rubi*). The spotting of leaves is frequently considered of minor importance, yet we must not forget that the leaves produce all the food for the plant. The crop depends upon the amount of food the plant can elaborate. This slide shows how the fungus attacks the leaves and causes dead and useless spots on the leaves.
13. **Cherry Shot-Hole** (*Cylindrosporium padi*). This is another slide showing the effects of a fungus on a leaf. In this case the spots eventually fall out entirely. Hence the name.
14. **Currant Leaf Spot** (*Septoria ribis*). The effect in this case is much the same as in Nos. 12 and 13. The spores are produced in little chambers (pycnidia) as in No. 12, instead of in little clumps.
15. **Currant Rust** (*Puccinia ribis*). Though not as serious as the rust on some other plants, this disease is of some economic importance.
16. **Grape Anthracnose** (*Gloeosporium ampelophagum*). This shows the effects on the grape.
17. **Grape Black Rot** (*Guignardia Bidwellii*). This disease causes the fruit to shrivel up and blacken. This slide shows the effect of the fungus and illustrates the spores produced in pycnidia.
18. **Grape Downy Mildew** (*Rhynchosphaera viticola*). The typical branched conidiophores and conidia of this very destructive enemy of the grape are brought out very clearly.
19. **Grape Powdery Mildew** (*Uncinula necator*). The preceding disease is produced by one of the so-called imperfect fungi while this is one of the ascomycetes. This slide showing the dark perithecia with their long coiled appendages is a beautiful preparation.
20. **Peach Brown Rot** (*Sclerotinia fructigena*). This is an extremely destructive disease of peaches especially while they are in transit. This slide clearly brings out the profuse spore production, bringing home, as no other means can, the reason for the rapid spread of the disease when there is sufficient moisture to permit the germination of the spores.
21. **Peach Leaf Curl** (*Exoascus deformans*). It is rather difficult to get a good mount of this material to show the asci, which are all that appear on the outside of the leaf. A satisfactory view of the asci, ascospores and mycelium in the leaf may be obtained from this slide.
22. **Peach Scab** (*Cladosporium carpophilum*). This slide shows the brown conidiophores growing up among the stout spine-like hairs on the surface of the fruit. The contrast between the two is very striking, not only in regard to size, shape and structure, but also in the way they take the stain.
23. **Pear Leaf Spot** (*Septoria pyricola*). These sections were cut in celloidin because of the extreme difficulty in cutting this material. The pycnidia with their long needle shaped spores can be studied very readily in these sections, while in the free-hand section, unless one is very skillful, it is difficult to get a satisfactory mount.
24. **Pear Scab** (*Venturia pyrina*). The general appearance is much the same as that of the apple scab.
25. **Plum Black Knot** (*Plowrightia morbosae*). Anyone who has ever tried to cut this material free-hand knows that it is likely to crumble. In these mounts the general appearance of the fungus, the method of fruiting and the peculiar effect on the wood can readily be made out. The sections are cut right through the distorted parts of the stem called the "Knots."
26. **Plum Pockets** (*Exoascus pruni*). The general structure is much the same as the fungus on peach leaf curl, except that it appears on the fruit, producing an enlarged, hollow, bladder-like plum.
27. **Raspberry Anthracnose** (*Gloeosporium venetum*). This slide is a section of a raspberry cane and shows the spores being produced in the sub-epidermal pustules.
28. **Raspberry Cane Blight** (*Leptosphaeria coniothrix*). This fungus is also known as *Coniothyrium fuckelii*. It is the same disease that attacks the blackberry. The disease is rather prevalent in certain sections of the country.
29. **Raspberry Rust** (*Gymnoconia peckiana*). Unless prepared slides are used, the spores in the case of the rusts are likely to break off and get lost before the mount is ready to be studied. This brings out clearly the groups of spores appearing under the epidermis, which they rupture and in that way get out and scatter from plant to plant.
30. **Carnation Rust** (*Uromyces caryophyllinus*). The carnation rust is a serious pest in carnations growing in the greenhouse. The conditions of crowding, temperature and moisture are ideal for the spread of this disease.
31. **Chestnut Bark Disease** (*Diaporthe parasitica*). In view of the serious ravages of the chestnut blight in this country, it is well to know what the disease looks like so as to be able to identify it with certainty as soon as it makes its appearance. It is also a good preparation to be used for classes.

For prices, see following page.

## PLANT PATHOLOGY AND AGRICULTURE SLIDES — Continued

32. **Maple Tar Spot** (*Rhytisma acerinum*). These sections are through the peculiar tar-like spots sometimes observed on maple leaves. These spots may readily be recognized by their close resemblance to a mark that might be left on a leaf if one should press a tar covered thumb on the leaf.

33. **Timber-Destroying Fungus** (*Trametes pini*). This slide is a section of pine wood which is so filled with the fungus that it has become absolutely worthless. The wood and the fungus have stained differently so that no one need have any difficulty in seeing the fungus right inside the wood and seeing how the connections between the individual cells of the wood are dissolved out, causing the destruction of the wood.

34. **Rose Mildew** (*Sphaerotheca pannosa*). The conidial stage is shown in this slide. Differential staining brings out the chains of spores very nicely.

35. **Rose Rust** (*Phragmidium subcorticium*). This makes a beautiful preparation showing the brown muriform spores of this rust.

36. **Asparagus Rust** (*Puccinia asparagi*). A good mount of two-celled teliospores.

37. **Bean Anthracnose** (*Colletotrichum lindemuthianum*). The masses of small spores stuck together by means of a gummy substance are shown all over the diseased area. After examining this mount the reason for the warning to keep out of the bean field when the plants are wet becomes very apparent.

38. **Cabbage Club Root** (*Plasmodiophora brassicae*). This is a section through the thickened root of a cabbage. It shows the organism inside of the cells of the cabbage root. This organism is neither a bacterium nor a fungus, but is one of the slime molds, which, during part of their life-history, look like plants and during part like some of the lower more simply organized animals of the protozoan group.

39. **Cucumber Anthracnose** (*Colletotrichum lagenarium*). This is a disease of cucumbers similar to that produced on the bean.

40. **Tomato Leaf Spot** (*Septoria lycopersici*). The spotting of tomato leaves is produced by a fungus closely related to that producing a similar effect on the leaves of pear, currant and blackberry.

41. **Corn Rust** (*Puccinia zea*). An interesting organism brought out clearly, though not of as great economic importance as some of the others.

42. **Corn Smut** (*Ustilago maydis*). This fungus is of great economic importance. Only the spores are shown in the mount since this organism is one of those which completely breaks up into spores, leaving no residue after this process has been completed.

43. **Cotton Anthracnose** (*Colletotrichum gossypii*). A good mount is necessary to bring out the characteristics of this destructive pest.

44. **Oat Smut** (*Ustilago avenae*). This slide shows the loose smut of oats. There are two smuts of oats, the loose and the covered. This slide brings out clearly the characteristics of the former kind.

45. **Bunt or Stinking Smut of Wheat** (*Tilletia foetida*). This fungus occupies the whole inside of the grain and finally breaks up completely into spores, leaving only the outer shell of the grain filled with the spores.

46. **Wheat Rust** (*Puccinia graminis*). This slide shows the aecial stage on the barberry. It is interesting because of the fact that the barberry acts as an intermediate host, especially in view of the widespread campaign that is carried on against the barberry. This fact also makes it difficult and perhaps impossible to secure this stage in many localities.

47. **Wheat Rust** (*Puccinia graminis*). This slide shows the black rust stage appearing on the wheat. When the spores from the barberry germinate they produce the rust on wheat.

48. **Rye Ergot** (*Claviceps purpurea*). In this disease the grain of the rye is replaced by the sclerotium of the fungus, which resembles it in shape but is dark in color and larger than the rye grain. Under favorable conditions these sclerotia germinate and produce the fruiting bodies, each composed of a long slender stalk on the top of which is found a knob. In this knob are the perithecia, little pockets containing the spores. The sections on this slide are through the fruiting body and show the perithecia containing the asci, each with eight long needle-shaped ascospores.

49. **Pore Fungus** (*Boletus versipellus*). This shows one of the pore fungi. They differ from the gill fungi, commonly called toad-stools, in that the spores are produced not on the surface of the gills, but they line the inside of the numerous minute pores found on the underside of the pileus.

50. **White Rust of Crucifers** (*Albugo candida*). This is not really a rust since it produces white glistening blisters on plants belonging to the mustard family, like pepper-grass, radishes, etc.

51. **White Rust of Crucifers** (*Albugo candida*). This slide shows the sexual stage of the preceding. In No. 50 the conidia are produced in chains just under the epidermis, producing the blisters. In this slide are shown the oogones and anthers lying in the deeper tissues and never produced on the surface like the conidia.

52, 53. **Rhizopus Nigricans** (Black Bread Mould). No. 52 shows the sporangia and No. 53 the zoospores of the black bread mold. This material is rather difficult to handle and is not always to be conveniently had when wanted. By the possession of these two slides the teacher is freed from the difficult and often fruitless search for both types of reproduction.

54. **Clover Stem** (*Trifolium pratense*). This is a cross section of a dicotyledonous type of stem. It is young and shows very beautifully the open collateral type of bundles. Compare with the following.

55. **Clover Stem** (*Trifolium repens*). This section is of the same material as the preceding but it is cut in a more mature region and serves to illustrate the manner in which stems of this type increase in size, a matter that the average student has considerable difficulty in understanding.

56. **Corn Stem** (*Zea mays*). This stem is a good illustration of the monocotyledonous type. It shows very beautifully the bundles of the closed collateral type. With the differential stain used on these sections, points are brought out that the average student does not get to see ordinarily.

57. **Bean Root** (*Phaseolus vulgaris*). All roots typically show the radial type of vascular bundles. The bean shows up perhaps as well as any that could be selected. The radial bundle in this case is of the tetrarch type.

58. **Cucumber Stem** (*Cucumis sativus*). Cucumber stems are fine for showing the sieve tubes—the tubes which carry the food away from the leaves after it has been produced there. The sieve plates and the contents of the cells show up very nicely—features which it is extremely difficult to demonstrate in free-hand sections.

59. **Asparagus Tip** (*Asparagus officinalis*). This slide is intended to show how a young stem tip grows. This slide, together with the preceding, illustrates very nicely the method of growth in plants.

60. **Basswood Stem** (*Tilia Americana*). The most common stem used for illustrating the woody type is basswood. This slide brings out the details better than a free-hand section. When stained with a differential stain, as in this case, it makes a beautiful preparation.

61. **Wheat Grain** (*Triticum vulgare*). This slide contains a cross section of a wheat grain, showing the entire structure of the grain.

62. **Corn Grain** (*Zea mays*). This is a section through a kernel of corn. To cut a section of a corn kernel is a long and tedious process as anyone who has ever tried it knows. This slide shows the epicarp, the horny endosperm, the starchy endosperm, the embryo, etc.

A2680. SINGLE SLIDES, chosen from the above list ..... Each \$0.40  
Per dozen assorted 4.20

## No. A2690. ZOOLOGY SLIDES

## PROTOZOA

1. Amoeba, the simplest of the protozoa and a type form-----	\$1.00
*2. <i>Paramoecium</i> , one of the most familiar of the protozoa. Slide shows general body structure, nuclei, vacuoles, etc-----	.35
3. <i>Paramoecium</i> . Slide shows the nucleus and protoplasm in state of division. This animal divides by a simple pinching into two parts-----	.50
4. <i>Paramoecium</i> , showing stages in the process of conjugation. This process illustrates the origin of sex in animals-----	.75
5. <i>Opalina</i> , a parasitic protozoan living in the intestine of the frog-----	.50

## SPONGES

6. Skeleton of Commercial Sponge, sectioned and stained-----	.35
*7. <i>Grantia</i> . Cross section showing the structure in a simple type of sponge-----	.40
*8. <i>Grantia</i> , longitudinal section. This section shows the pores and ampullae from another view-----	.40
9. Fresh Water Sponge. The sponges living in fresh water are of much interest from many points of view. The slide shows the spicules and other structures-----	.50

## COELENTERATA

10. <i>Hydra</i> , entire, killed extended, showing the tentacles, etc-----	.40
*11. <i>Hydra</i> , cross section showing the three body layers, the gastrovascular cavity, etc-----	.40
12. <i>Hydra</i> , whole mount showing bud growing out from the adult-----	.75
*13. <i>Hydroid Colony</i> , entire. Shows the different types of zooids and the method of growth-----	.50
*14. Jelly Fish, small species, mounted entire-----	.50
*15. Sea Anemone, cross section showing the compartments and other details of internal arrangement-----	.40

## FLAT WORMS

16. Planarian, entire, showing the eye spots, the auricles, pharynx, digestive system, etc-----	.50
17. Planarian, cross section, showing the muscle layers, the thick parenchyma, etc-----	.50
18. Fluke Parasite, from frog. A majority of the flat worms are of parasitic habit and the species in question is a good example-----	.50
*19. Tape Worm. Segments mounted entire. Shows the sex-organs, etc-----	.50

## ROUND WORMS

*20. Ascaris, a parasitic round worm. Cross section showing the structure of this group of worms-----	.50
*21. Trichina, the round worm parasite that man gets by eating underdone pork. The slide shows the worm in position in the muscle of the pig-----	.50

## ANNULATA

22. a. Hook-Worm, male and female on single slide-----	2.00
b. Hook-Worm, male or female singly-----	1.25
23. Small Annelid Worm, entire, showing the characteristic segmentation, the setae, etc-----	.40
*24. Earthworm, cross section. This slide is stained so as to make the different body layers stand out clearly-----	.40
25. Earthworm, longitudinal section. Shows the arrangement of the septa, the nephridia, etc-----	.50

26. Earthworm Spermatozoa, stained and differentiated-----	.50
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## MOLLUSCA

*27. Clam Gill, cross section. Shows the arrangement of the water passages, the ciliated epithelium, etc-----	.40
28. Clam Glochidia. This is the larval stage of the clam. This stage is parasitic on the skin and gills of fishes for a time-----	.40
*29. Snail Radula, the rough chitinous tongue with which the snail rasps its food from moist slimy surfaces-----	.40

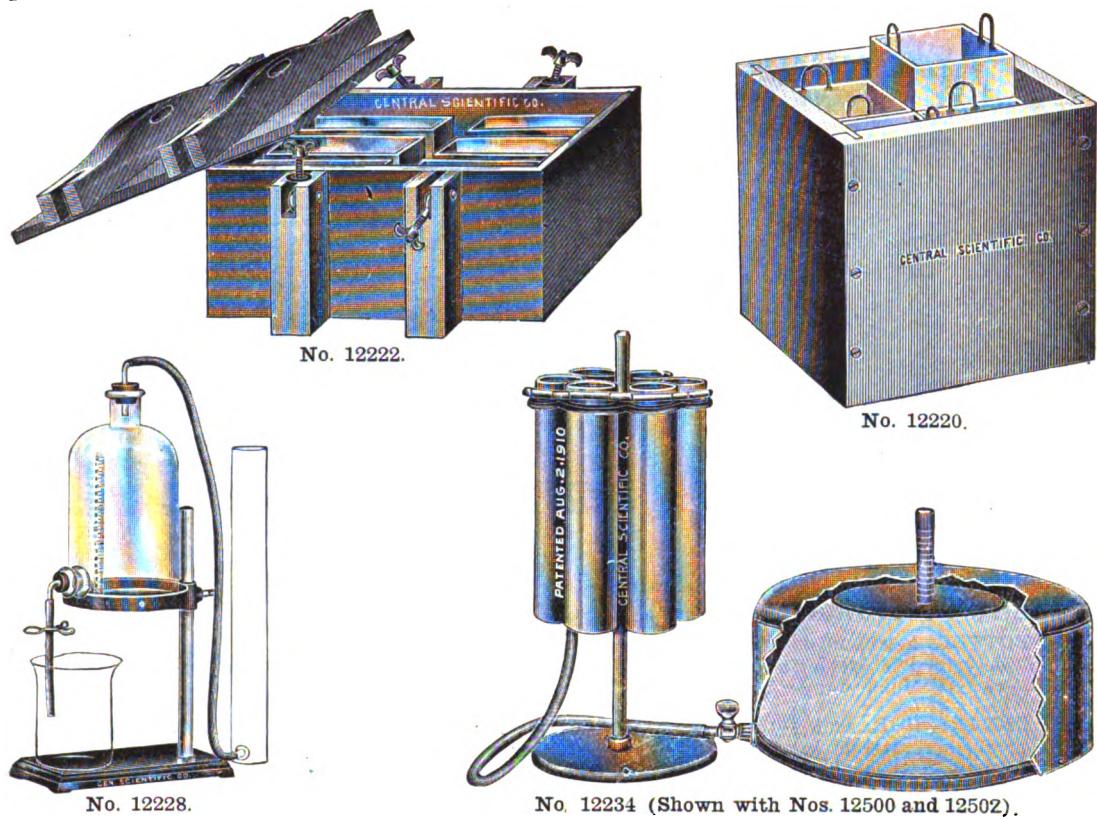
## INSECTA

*30. Proboscis of House Fly. This is the lapping type of fly-----	.35
*31. Mouth Parts of Honey Bee. Shows the long tongue, the degenerate mandibles, etc-----	.35
*32. Antenna of Moth, pectinate type, being highly branched-----	.35
33. Antenna of Butterfly, the clubbed type of antenna. Moths and butterflies can be separated on this basis-----	.35
34. Proboscis of Butterfly. The long sucking tube is formed of two half tubes closely joined together-----	.35
*35. Proboscis of Mosquito. Piercing mouth-parts and characteristic antennae-----	.35
*36. Trachea of Insect. Dissected out, stained and mounted to show the peculiar structure-----	.35
*37. Sting of Bee. The bee's sting is a modification of the egg laying organ. The slide shows also the poison sac and the tube attaching it to the sting-----	.40
*38. Crop of Grasshopper or Cricket. Shows the strong chitinous teeth or plates which are used in breaking up the food-----	.35
*39. Compound Eye of Insect, sectioned to show the facets and their nervous connections-----	.40
40. Spiracle of Insect, dissected out and mounted entire. Diagrammatic-----	.35

## VERTEBRATA

*41. Frog Skin, sectioned and stained to bring out the mucous and poison glands-----	.40
*42. Frog Stomach, cross sectioned and carefully stained. Shows all the layers clearly-----	.40
43. Frog Liver. Shows the large cells with their nuclei-----	.40
44. Frog Kidney and Testis. In the animal these organs lie side by side and the spermatozoa pass to the outside by going through the kidney. The organs are sectioned and mounted in their natural position-----	.40
45. Frog Spinal Cord. Shows the two main regions and the cells which they contain-----	.50
46. Ciliated Epithelium from the Roof of the Frog's Mouth. This is excellent epithelium for study-----	.40
47. Necturus Stomach, cross section. Stained same as slide No. 40-----	.40
48. Necturus Intestine. A very simple type of villus is shown here-----	.40
*49. Wing Feather of Bird. Mounted entire so as to show barbs, barbules, etc-----	.35
*50. Down Feather, stained and mounted entire. Shows the filoplume type-----	.35
51. Fish Scales, stained and mounted entire. These scales show pigment cells in various stages of contraction and are excellent for this study-----	.35
52. Snake Skin. Flat mount showing the arrangement of the scales on the body. Stained-----	.35

A2691. COMPLETE SET OF 25 SLIDES marked with asterisk (\*), in wooden slide box..... 9.00  
In ordering, kindly give full name of slides desired to avoid confusion.



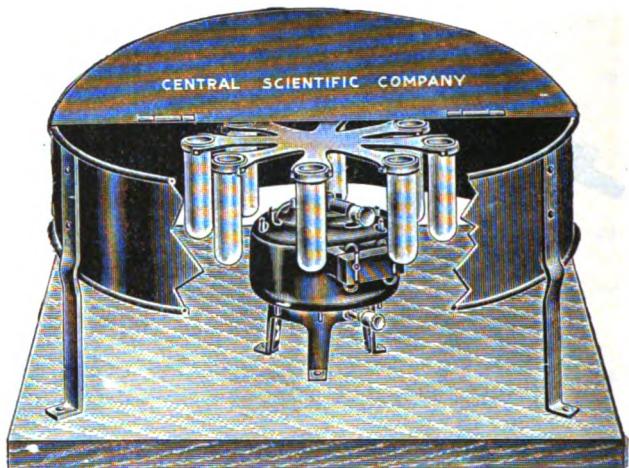
## SOIL ANALYSIS APPARATUS INCLUDING APPARATUS FOR PHYSICAL PROPERTIES OF SOILS

(Arranged Alphabetically.)

12220. <b>ABSORPTION APPARATUS, Heat</b> , for absorption of heat by soils, as described by Stevenson & Schaub. This apparatus is used to compare the temperatures of various soils at different depths when the soils are exposed to the direct rays of the sun, and consists of four zinc boxes 4x4x8 inches deep, enclosed in a wooden box open at the top.....	<b>\$7.50</b>
12222. <b>ABSORPTION APPARATUS, Moisture</b> , for determining the power of dry soils to absorb hygroscopic moisture from a saturated atmosphere. A water-tight, water-proofed substantial wooden box with heavy cover so designed that it may be clamped air-tight to the box. (A metal box is not satisfactory, because it is so affected by temperature conditions that the results obtained have little or no value.) Wooden strips, not shown in the illustration, support the soil pans and have a device for holding the strips of absorption paper which by capillary action absorb water, keeping the air within the box in a saturated condition. Complete with six soil pans.....	<b>20.00</b>
12223. <b>SOIL PAN</b> of zinc, 6½x6½x1½ inches, as used in No. 12222 Absorption Apparatus. These pans are water-tight and will be found convenient for use in drying ovens.....	<b>Each .35</b>
12228. <b>ASPIRATOR, McCall</b> , for studying the rate of the flow of water through soils of different textures. This aspirator has no moving parts to cause errors from friction and the method of operation is exceedingly simple. The bottle is first filled with water to a definite mark on the scale and connections are made as shown in the illustration. The pinchock is then opened and water allowed to run from the bottle until it stands at a much lower level. By noting the time required with different soils, the relative rate of flow is readily determined. Complete as illustrated, with metal support, but without soil tube or beaker.....	<b>9.25</b>
12229. <b>SUPPORT</b> only of No. 12228.....	<b>4.00</b>
12230. <b>ASPIRATOR BOTTLE</b> only of No. 12228. Complete with rubber stoppers, rubber tubing, and pinchock .....	<b>5.25</b>
12234. <b>ASPIRATOR</b> , for determining the comparative porosity of soils by measuring the rate of flow of air through them under constant pressure. This apparatus consists essentially of a closed pressure chamber formed by a rubber diaphragm or bag placed between a movable weight and a wooden base 15 inches in diameter. To the weight is attached a graduated rod, by reference to which definite quantities of air may be forced through the different soils under consideration. The pressure chamber is enclosed in a suitable casing for protection. Without soil tubes or support stand.....	<b>25.00</b>



No. 12238.



No. 12242.

**AUGERS**, see **Soil Sampling Apparatus**.

**BINS OR CONTAINERS** for **Soil**, see general heading **Bins or Containers**.

12238. **BOTTLE**, Mechanical Analysis, convenient for separating soils into their constituent parts, as described in Mosier and Gustafson's "Soil Physics Laboratory Manual." Complete with inverted rubber stopper and tubes..... \$0.85

12242. **CENTRIFUGE**, **Soil**, for preparing soil samples for Mechanical Analysis. This machine is of excellent design, having features suggested by agronomists. The motor is mounted with shaft vertical, thus obviating considerable vibration and allowing easy access to the soil tubes. A brass trunnion arm, mounted on this shaft, carries eight soil tubes, which are of heavy well annealed glass and are encased in aluminum sheaths. These sheaths are held in trunnions to the trunnion arm by hardened steel bearings. The whole is protected by a metal covering, which extends to the floor or table on which the motor rests, access to motor and tubes being gained by means of a hinged cover.

Complete with  $\frac{1}{6}$  h. p. motor, of 1800 r. p. m. no load speed, ready for mounting on a table top, and eight soil tubes. No. .... A B C D

For volts.....	110	220	110	220
Each .....	125.00	135.00	120.00	135.00

12243. **EXTRA SOIL TUBES**, heavy glass,  $6\frac{1}{4} \times 1\frac{1}{4}$  inches, as used in No. 12242. .... each .25  
..... per dozen 2.50

12246. **CENTRIFUGES**, International, Electric, with equipment for mechanical analysis of soils, including speed control rheostat; No. 2685 Eight-tube Head; eight No. 2710 Metal Tubes, 100 cc, with No. 2711 Trunnion Rings; eight No. 2718 Rubber Cushions; 72 No. 2716 Plain Glass Tubes, 100 cc; and an 8-tube Rack. Dimensions: 23 inches high, closed; 35 inches high, open; and 24 inches in diameter, with a shipping weight of about 300 pounds.

No. ....	A	B	C	D
	A.C.	D.C.		
For volts ..	110	220	110	220
Each ...	149.50	149.50	117.00	117.00

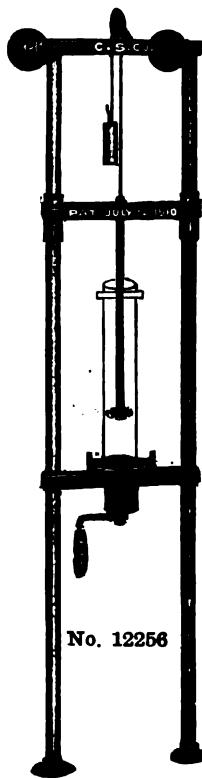
2716. **TUBES**, Glass, plain, lipped, 100 cc, for No. 12246 Centrifuge..... each .25  
..... per dozen 2.50



No. 12246.



No. 12252.



No. 12256

12252. **CENTRIFUGES, Moisture Equivalent**, Briggs-McLane, as described in the Proceedings of the American Society of Agronomy, Volume 2, 1910.

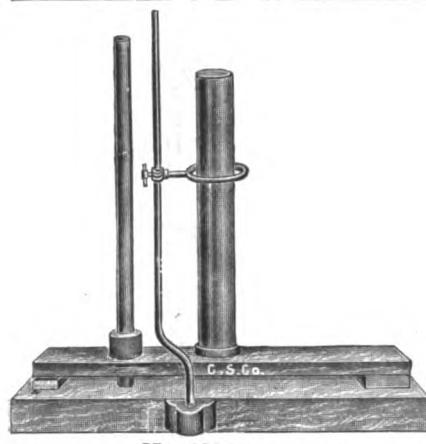
This centrifuge is used for determining the relative moisture equivalents of soils where the term moisture equivalent designates the maximum percentage of moisture which a soil can retain in opposition to a known centrifugal force. For a standard of comparison, a centrifugal force equal to 1,000 times the force of gravity has been adopted. In making the determinations, the soils, suitably moistened, are placed in cups with perforated bottoms. These cups are then placed in the cylinder of the centrifuge and rotated at a constant speed, so chosen as to develop the required centrifugal force. "Each soil now loses water until the capillary forces have increased sufficiently to balance the centrifugal force acting on the soil moisture. Since the moisture content of each soil which has been treated in this way is in capillary equilibrium with the same force, it follows that if these moist soils are placed in contact in any order whatever no movement of water from one soil to another will take place. A condition of complete equilibrium exists throughout the series of soils thus treated." It is then necessary only to determine the moisture content of each soil corresponding to this condition of equilibrium in order to determine its quantitative position in the scale of moisture retentiveness. The centrifuge here described is capable of maintaining the required centrifugal force well within the desired limit of accuracy.

The instrument consists of a bronze disk cylinder containing 16 soil boxes with wire gauze bottoms, and attached to the shaft of a vertically mounted D. C. motor. The motor is provided with a Kellogg Constant Speed Governor which has a range from 2380 to 2500, thus bringing the desired point of speed, 2440 r. p. m., about the middle of the dial. If alternating current only is available, a motor-generator set should be used to produce the direct current necessary. See Nos. 4824 to 4848. Complete as described.

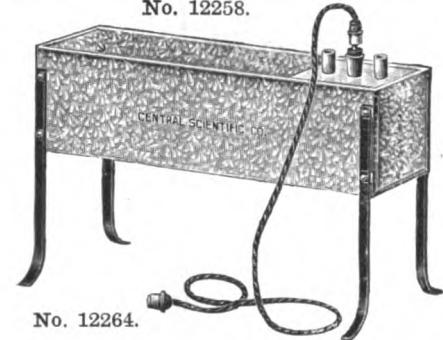
No. ....	A	B
For volts .....	110	220
Each .....	\$309.40	309.40

For other **CENTRIFUGES**, see general heading **Centrifuges**.

12256. **COMPACTING MACHINE**, designed for obtaining uniform compaction of soils in tubes 18 inches or less in length and four inches or less in diameter. It consists of two uprights having sockets at their lower ends for attachment to the floor and a cross bar with wall attachments at their upper ends. A cross bar fastened rigidly to these uprights carries a rotating tube socket or holder which is rotated by means of a crank. Twice during each revolution the tube is raised to the height of  $\frac{1}{4}$  inch by means of inclined surfaces under the tube holder, and automatically dropped, which process jars the soil into position. A small propeller is attached to the end of the rod extending down from the sliding cross bar. This pro-



No. 12258.



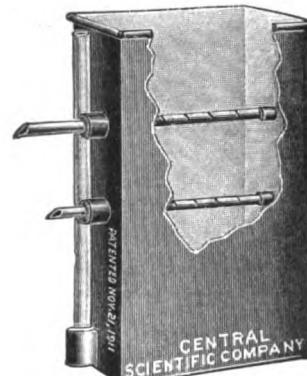
No. 12264.



No. 12262.



No. 12268.



No. 12272.

**COMPACTING MACHINE, Continued.**

peller is placed at the bottom of the tube to be filled and soil then poured into the tube. Twice during each revolution it drops with the soil tube, thus striking a definite number of blows on the soil column as it rises.

This compactor is built to compact soils to approximately the same condition in which they are found in the fields and to give uniform compaction for comparative tests. It is simple in principle and does its work quickly and easily. With two propellers (one for 2-inch tubes and the other for 4-inch tubes), weight holder, and weights..... \$35.00

12258. **COMPACTOR, Spring Board**, necessary for compacting soils in glass tubes. Base of wood 8x24 inches; spring board firmly fastened to base at one end; massive slip-weight slides on nickel-plated rod. A very substantial and well-finished piece ..... 10.00

12262. **CONDUCTIVITY APPARATUS**, for determining the thermal conductivity of soils. This design has been modified from the original design in use at the University of Illinois Soils Laboratory. A galvanized iron soil tray, 16x4x5 inches, has at one end a water-tight boiling tank, 4x4x5 inches. Attached to this tank is a heating coil, as shown in the illustration, by which the water in the tank can be kept at the boiling point indefinitely. By this method of heating, the errors present in the old apparatus due to direct heating from the flame are entirely avoided. The boiling tank is provided with tubulations for thermometer and for reflux condenser which may be used if desired. Complete as illustrated..... 6.00

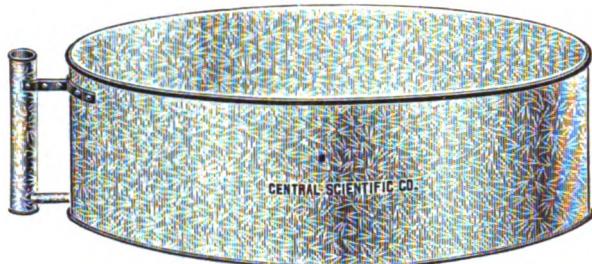
12264. **CONDUCTIVITY APPARATUS**, similar to No. 12262, but without heating coil and with an electrical heating unit. This method of heating was suggested by the Department of Soil Technology of the New York State College of Agriculture at Cornell University and has proved very satisfactory. For 110-volt current, either alternating or direct. Power consumed, 350 watts ..... 13.00

For **CONDUCTIVITY BRIDGE**, see No. 12400.

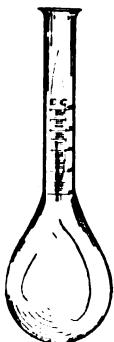
12268. **DIGESTION CUP**, porcelain, for acid digestion of soils (Hilgard's Method). Capacity, 50 cc ..... .40  
**DISHES, MOISTURE**, see general heading **Dishes**.

12272. **DRAINAGE AND WATER TABLE APPARATUS**, Graham & McCall's, designed to show the behavior of capillary and free water in the soil, and the principles involved in the proper construction of a barnyard to prevent loss of plant food; of copper, 3x6x12 inches high, with a solid bottom to represent hard clay or stone. Through the vessel are two brass tubes, sawed transversely, which communicate with the outside, representing tile drains at different depths. A standpipe shows the height of free water inside the vessel.

To operate, fill the vessel with soil and pour on water at regular intervals, giving it time to soak into the soil. The water, instead of coming out at the tubes, will pass downward through the soil until the solid bottom is reached, when a water-table of free water will be formed at a height indicated by the free water in the glass standpipe. When the free water has risen to the first opening it will pass outside the vessel, thus proving that a tile drain placed as low as soil conditions will permit removes free water before one placed not so deep.



No. 12278.



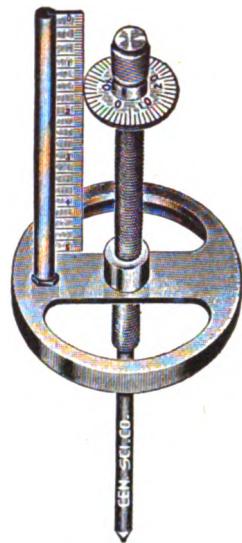
No. 5644.



No. 12282.



No. 12286.



No. 12276.

**DRAINAGE AND WATER TABLE APPARATUS, Continued.****Some Things Which the Apparatus Will Show:**

Tile drains do not remove capillary water. A deep drain removes the first water.

No water is removed until the soil at the drain line is beyond the point of saturation.

The volume of soil available for plant food is greater in a drained soil.

The volume of soil retaining capillary water is greater where the drains are deep.

Plant food would not be wasted by leaching from a barnyard having a tight floor of clay or cement and some kind of retaining wall around the outside..... \$10.00

**DRYING OVENS**, see general heading **Ovens**.

5644. **ELUTRIATING FLASK**, Bennington's. The bulb has a capacity of about 400 cc, and the neck is graduated to 40 cc in 1 cc divisions..... 1.50

12276. **EVAPORATION GAGE**, micrometer screw form, for measuring rate of evaporation, as described in Bigelow's "Manual for Observers in Climatology and Evaporation" (U. S. Weather Bureau No. 409). A micrometer screw is mounted on a cap suitable for supporting it on the top of a still well 3 inches in diameter. The screw proper is 5 inches long with 20 threads to the inch. The micrometer head is graduated in 50 divisions so that readings may be taken to  $\frac{1}{1000}$  of an inch. For convenience in reading a linear scale graduated in 20ths of inches is provided. The total distance from the head to the end of the pointer, which is of incorrodible material, is 12 inches. The pointer may be unscrewed and a hook screwed in its place, thus making the instrument serve as a hook gage. Complete as described, with pointer and hook ..... 20.00

12278. **EVAPORATION TANK** for use with No. 12276 Evaporation Gage, of heavy galvanized iron 6 feet in diameter by 2 feet deep. A still well 3 inches in diameter is firmly attached to one side of the tank and connected with the tank at the bottom by a galvanized pipe of sufficient size to allow free flow of water between the tank and still well..... 75.00

**Note.**—Tanks of different dimensions can be furnished if desired.

12282. **EVAPORIMETER**, for determining the amount of water evaporated from the surface of various soils in a given time; for determining the effect on evaporation produced by different fertilizers, and different methods of cultivation. It consists of a brass tube 4 inches in diameter and 9 inches long having a perforated metal bottom to allow free ingress of water. This tube fits into a water-tight spun brass base. In operation the tube is filled with soil which is compacted by means of the Soil Compacting Machine (No. 12256). It is then placed in position in the base. Water of known weight is placed in the base whence it passes through the perforated bottom of the tube to the soil and is evaporated from its surface. The apparatus is entirely of brass, durably made, highly polished and lacquered..... 7.00

12283. **EVAPORIMETER**, same as No. 12282, but with brass tube 18 inches long..... 8.00

12286. **EVAPORIMETER**, for finding the co-efficient of evaporation from soils. The soil container is of copper with brass bottom perforated with one millimeter circular openings. This container is placed in a copper water jacket 3x8 inches ..... 4.50



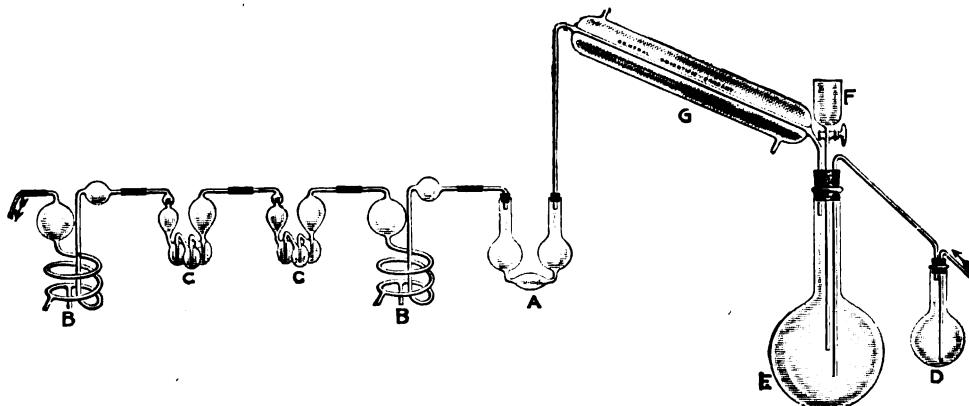
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No. 12298.



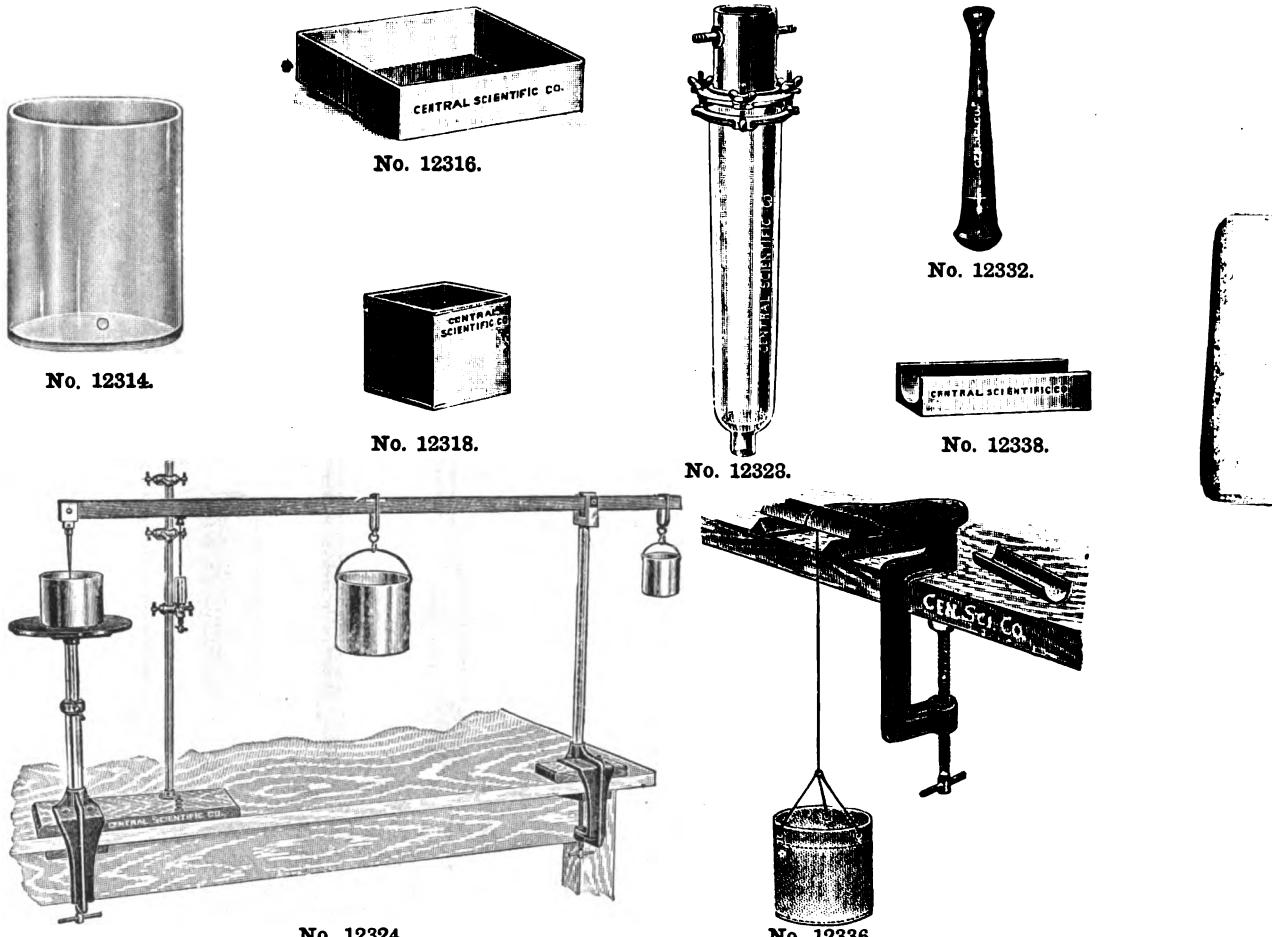
No. 12302.



No. 12308.

**FILTERS, Soil, see general heading Filtering Apparatus.**

12290. <b>LIMESTONE TESTER, Hopkins</b> , for determining the purity of limestone. The outfit consists of two glass vessels joined together, one for holding the limestone sample, the other for the charge of acid. The apparatus is light and easily weighed. (See Bulletin No. 194 of the University of Illinois Agricultural Experiment Station) .....	\$3.50
<b>MICROSCOPES</b> , see general heading <b>Microscopes</b> .	
<b>MILLS</b> , Grinding, see <b>Crushing and Grinding Apparatus</b> .	
<b>MOISTURE DISHES</b> , see general headings <b>Boxes, Dishes</b> .	
12298. <b>MULCH CYLINDER, McCall's</b> , for determining the effect of mulches upon the rate of evaporation from soils. Design as illustrated; of galvanized iron, 19 inches high; approximate diameter at top 4 inches; at bottom 8 inches.....	.475
12300. <b>MULCH CYLINDER, McCall's</b> , same as No. 12298, but 29 inches high.....	6.25
12302. <b>MULCH CYLINDER, Stevenson &amp; Schaub's</b> , of galvanized iron 11 inches in diameter by 13 inches high, with water supply tube.....	4.00
12308. <b>ORGANIC MATTER DETERMINATION APPARATUS</b> , for determination of organic matter in soils by the wet combustion method. Consists of two flasks, two Mohr-Geissler Potash Bulbs, one Peligot Tube, two Winkler's Spiral Potash Bulbs, Condenser, Dropping Funnel, rubber stoppers and connecting tubes. (See Bulletin 24, U. S. Bureau of Soils) .....	15.00
10932. <b>POTASH TUBE, Peligot (A)</b> .....	.50
10938A. <b>POTASH BULB, Winkler's, 100 mm (B)</b> .....	2.90
10916. <b>POTASH BULB, Mohr-Geissler (C)</b> .....	1.50
5550B. <b>FLASK, Potassium Hydrate, 200 cc (D)</b> .....	.22
5550C. <b>FLASK, Round Bottom, 300 cc (E)</b> .....	.28
6160B. <b>FUNNEL, Separatory, 60 cc (F)</b> .....	1.45
3224C. <b>CONDENSER, 15 inch (G)</b> .....	1.40



No. 12324.

No. 12336.

12314. **ORGANIC MATTER JAR.** A 1-gallon glass jar provided with a round hole for drainage, 1 cm in diameter, located 1 cm above the bottom ..... \$1.00

12316. **PAN**, of metal, water tight,  $4\frac{1}{4} \times 4\frac{1}{4} \times 1\frac{1}{2}$  inches. For use in Drying Ovens..... .50

12223. **PAN**, of zinc,  $6\frac{1}{2} \times 6\frac{1}{2} \times 1\frac{1}{8}$  in., as used in No. 12222 Absorption Apparatus. These pans are water tight and will be found convenient for use in drying ovens..... .35

12318. **PAN or BOX**, of zinc,  $4 \times 4 \times 4$  inches, for volume-weight experiments..... .80

**SAMPLE CANS OR BOXES**, see general heading Boxes.

12324. **PENETROMETER**, for determining the firmness of soil due to its cohesion, by means of the resistance offered to the introduction of a sharp instrument. The apparatus is essentially as described in the Bulletin referred to, but is supplied with a device for making electrical contact when the soil has been penetrated to the desired depth, as suggested by Prof. Charles F. Shaw of the University of California. Complete as illustrated. (See Bulletin No. 50, Bureau of Soils) ..... 75.00

12328. **PERCOLATION APPARATUS**, McCall's, for determining percolation of water through soils. Glass percolator,  $1\frac{1}{2}$  pint, with brass extension having lateral tubes. Complete with rubber gasket, copper gauze, etc..... 8.00

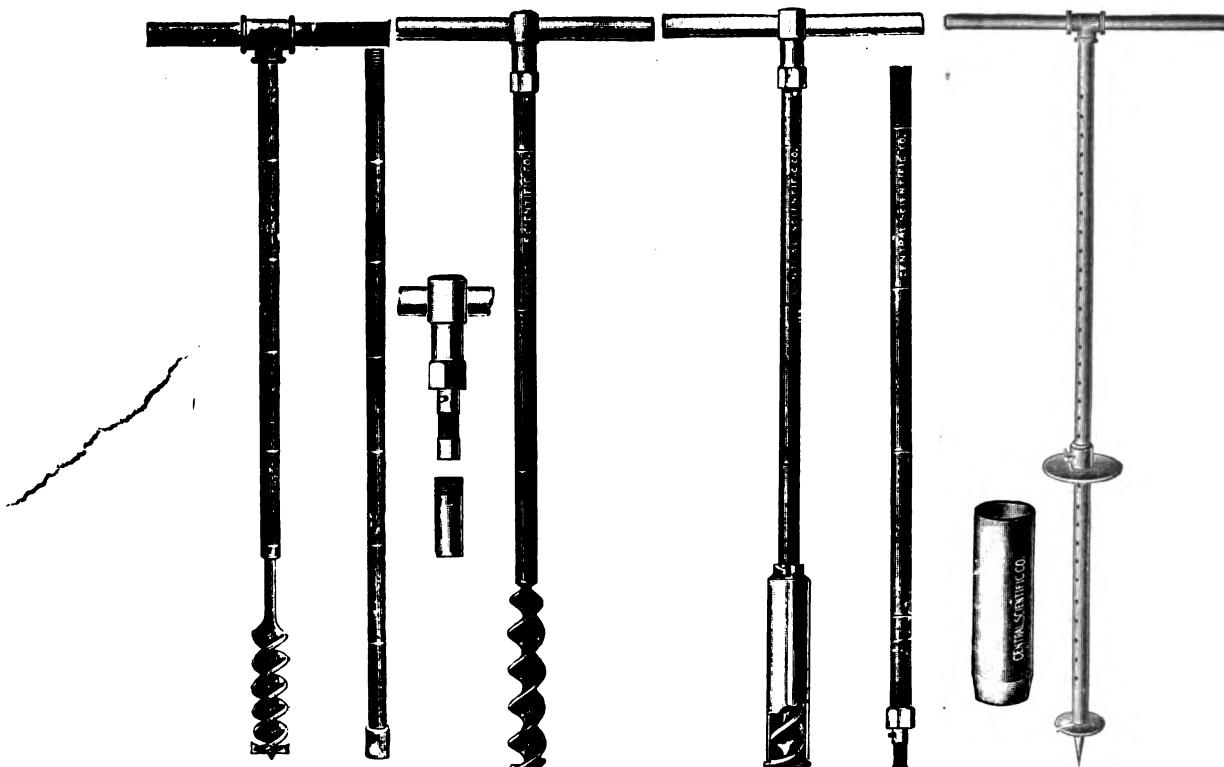
**PERCOLATORS**, see general heading Percolators.

12332. **PESTLE**, Rubber, for preparing soils for analysis; 7 inches long, wood handle with rubber tip ..... .30

12336. **PLASTICITY APPARATUS**, for determining the effects of lime on plastic soils. Consists of a clamp with two knife edges about 4 inches apart, across which the briquet to be tested is placed for breaking, a heavy canvas bag for holding weights and shot and one No. 12337 Mold, 5 inches long, 1 inch wide and  $\frac{3}{4}$  inch deep, as illustrated. For those who wish a mold of more accurate dimensions, the purchase of No. 12338 Mold is recommended. (This design has been developed from the original in use at the University of Illinois, in co-operation with the Soil Physics staff of the University)..... 3.25

12337. **MOLD** only of No. 12336..... .25

12338. **MOLD**, improved form, for No. 12336, as suggested by A. F. Gustafson of the University of Illinois. Of cast brass, accurately milled to shape. All molds are therefore identical and always occupy the same position on the table, so that the bricks of soil obtained are accurate and uniform in shape. Inside cross section  $\frac{1}{2}$  square inch, length, 5 inches..... 1.50



Nos. 12342-3.

Nos. 12346-8.

No. 12350. No. 12351.

No. 12354.

### SOIL SAMPLING APPARATUS

12342. **SOIL AUGER** for obtaining soil samples. Length 36 inches with graduations every 6 inches; handle detachable; steel cutting edge  $1\frac{1}{2}$  inches in diameter. The length may be increased to 72 inches by the insertion of No. 12343 Extension. Complete with handle but without additional length..... \$6.00

12343. **EXTENSION** of 36 inches for use with No. 12342 ..... 1.10

12346. **SOIL AUGER**, improved form with stem and handle of smooth finished steel. The handle is attached by means of a lock nut of new design which entirely does away with the loosening and tightening up at the joint which has caused so much difficulty in the earlier types of Soil Augers. This Auger has been made 24 inches long for convenience in carrying when in the field. For use at greater depths extensions 2 feet long and 4 feet long have been provided. (See Nos. 12351 and 12352.) The auger bit is  $1\frac{1}{2}$  inches in diameter and the stem is graduated every 6 inches. This is a thoroughly high-grade tool for the most exacting service 14.00

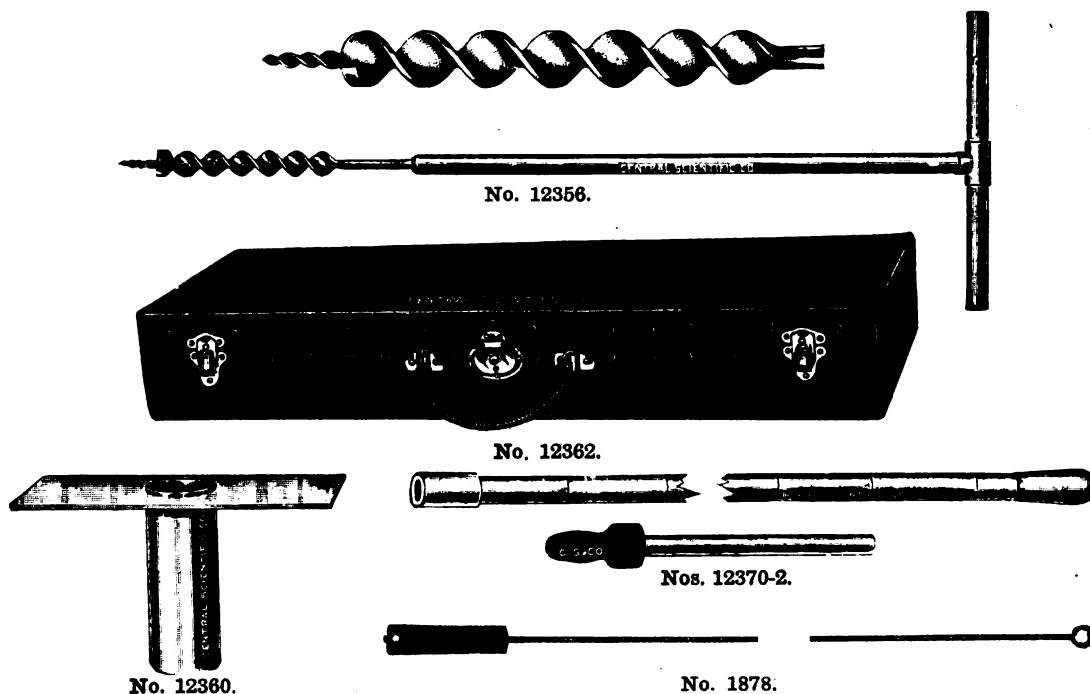
12348. **SOIL AUGER**, same as No. 12346 but with auger bit 2 inches in diameter..... 18.00

12350. **SOIL AUGER**, with **Sleeve**, for use in dry soils. This Auger is the same as No. 12346 except that it is provided with a steel sleeve which fits over the auger bit, resting on a projection at the lower end so that the diameter of the cutting edges is larger than the outside diameter of the sleeve. This sleeve is held firmly in position at the upper end by an ingenious locking device and serves to hold in position the dry soil which otherwise would not cling to the Auger when removed from the ground. 2 feet long, graduated every 6 inches. Complete with sleeve and handle..... 20.00

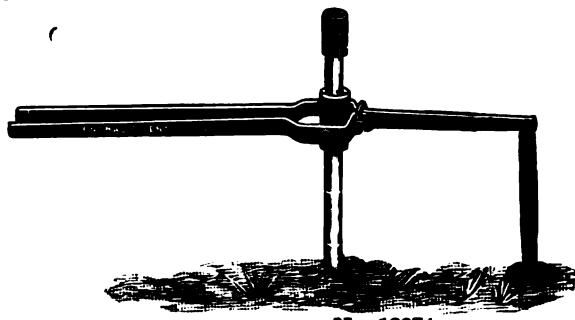
12351. **EXTENSION**, for use with Nos. 12346 to 12350 Soil Augers. Complete with lock nut. Exactly 24 inches long and graduated every 6 inches ..... 6.00

12352. **EXTENSION**, for Nos. 12346 to 12350 Soil Augers. Same as No. 12351 but exactly 48 inches long ..... 6.75

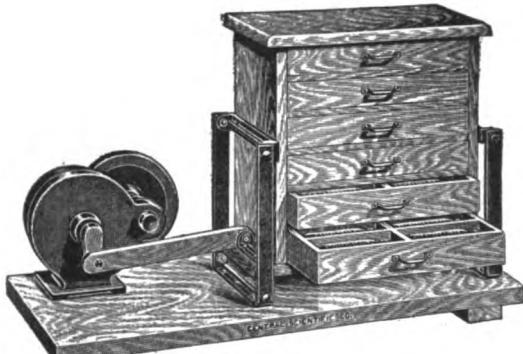
12354. **SOIL AUGER, Nebraska Design**, designed for general work in soil investigation; especially adapted to work where samples at exact depths are desired, since with this instrument it is possible to secure samples of soil one inch in thickness to a total depth of two feet. This type of auger has been used with satisfactory results by the Nebraska Agricultural Experiment Station in securing samples of soil for chemical analysis and soil moisture studies. The auger is also well adapted for use in making determinations of the apparent specific gravity of soils under field conditions, since a definite volume of soil may be removed without the necessity of digging around a tube and cutting the soil off even with the lower edge. In use the auxiliary tube is driven into the soil to such a depth that when the auger blade is just resting on the surface of the soil, the adjustable gage may be set in the first notch on the auger stem, and at the same time rest on the top of the tube. The gage is then raised

**SOIL AUGER, Nebraska Design, Continued.**

to the next notch and the auger turned until the gage again comes in contact with the top of the tube, or, in other words, has removed one inch of soil, since the notches are one inch apart. In this manner, a sample of soil from each inch may be obtained to a depth of 2 feet. Complete with auxiliary tube.....	\$17.00
12356. <b>SOIL AUGER, Pugh's.</b> According to Dupont specifications this auger is especially designed for use in hard ground, and is the best tool on the market for penetrating the hard pan. It is hand-made out of special steel, and actual tests made in all parts of the world have proved that one Pugh will outwear and outlast a dozen or more of any other make. Useful for soil sampling, tree planting, ditching, drainage and other earth boring where deep holes are required, or where the ground is hard. With extensions it can be lengthened so as to reach to any desired depth; it is used very extensively for prospecting or for well boring, as well as for agricultural work. Length, 4½ feet; weight, 10 to 12 pounds; bit, 1½ inches in diameter; complete with handle 18 to 21 inches long .....	5.10
12357. <b>EXTENSION for No. 12356 Soil Auger.</b> Length, 3 feet.....	1.00
12360. <b>FOOT PLATE,</b> for use with any Soil Auger 2 inches or less in diameter to prevent the crumbing away of the soil around the edge of the hole. Consists of a steel tube slightly over 2 inches in diameter provided at the upper end with a steel plate about 4.5x10 inches. The tube is driven into the ground before the sampling hole is started and the Plate makes a convenient rest for the feet during the entire operation of removing samples.....	4.00
12362. <b>CARRYING CASE,</b> for Auger Field Set, substantially made of hard black fiber with lock and clasps, and handle for carrying. Compartments are provided for holding one No. 12346 Auger (or one No. 12350 Auger), one No. 12348 Auger, two handles for the above, four No. 12351 Extensions, and a wrench for the lock nuts. Complete with Wrench, but without Augers or Extensions .....	12.50
12364. <b>AUGER FIELD SET,</b> consisting of No. 12362 Carrying Case with wrench, one No. 12346 Auger, one No. 12348 Auger, and four No. 12351 Extensions .....	68.50
12366. <b>AUGER FIELD SET,</b> same as No. 12364, but with No. 12350 Auger instead of No. 12346. 74.50	
12370. <b>SOIL SAMPLING TUBE, King's.</b> Tube of brass, 5 feet long, graduated every 6 inches. Cutting head of steel with area of opening one ten-millionth of an acre. Steel collar at top to receive blows of hammer shown in illustration. This hammer is of cast iron, weighing 8 pounds, and is of suitable shape to be held easily in the hand.	
To obtain soil samples the tube is driven into the ground to the desired depth by means of the hammer. A column of soil is thus forced up into the tube from which it is jarred after removal from the ground. The outside of the cutter being larger than the tube allows it to be drawn from the ground more easily. If, however, the tube is not withdrawn from the ground with sufficient readiness, No. 12374 Tube Hoist should be used.	
With Hammer.....	12.00
12372. <b>SOIL SAMPLING TUBE, King's,</b> same as No. 12370, but 3 feet long. With hammer... 10.00	
1878. <b>SAMPLING TUBE BRUSH,</b> for cleaning Nos. 12370 and 12372 Soil Sampling Tubes. Bristle brush, with strong wire handle. Total length, 65 inches.....	.25



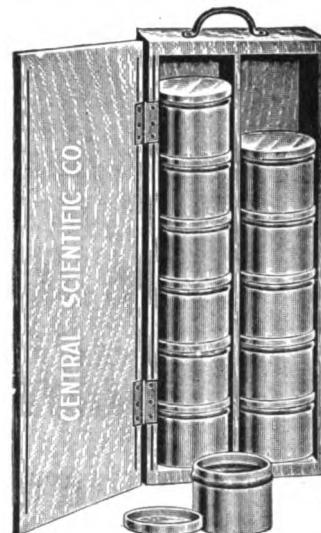
No. 12374.



No. 12388.



No. 12378.



No. 12386.



No. 12376.

12374. **SOIL SAMPLING TUBE HOIST.** This contrivance will fill the need for some device for removing Soil Sampling Tubes from the ground. Movement is imparted upward on the handle and, the leverage being ample, no great effort is needed to remove tubes from the most solid soils. Hoist only, without Sampling Tube..... \$10.00

12376. **SOIL SAMPLING TUBE,** Whitney's, especially useful for obtaining samples for determination of moisture content and nitrifying power of soils; a brass tube 9 inches long, sharpened at one end and with a mark 6 inches from that end, provided with rubber caps for closing each end air tight..... 1.00

12378. **SOIL SAMPLER,** Bacteriologist's, after specifications by H. A. Noyes of the Purdue University Agricultural Experiment Station. This sampler is a brass cylinder 11 inches long by 2 inches in diameter, with an especially constructed cutting edge. The end having the cutting edge is furnished with a tight fitting brass cap 2 inches in height. When the upper end is plugged with absorbent cotton, the sampler is ready for sterilization. The sampler is easy to sterilize, easily kept clean, easy to use, and durable, and hence will be found valuable in bacteriological work. This apparatus will (1) sample accurately soil subjected to any system of management; (2) not interfere with the field conditions existing where the sample is taken, thus making future samples comparable; (3) give a representative sample of soil; and (4) keep the sample practically under field conditions until analyzed, since the tube itself acts as container for the sample. Graduated as shown in the illustration, and with directions for use..... 3.00

12379. **DRIVING HEAD,** of cast iron, for use with No. 12378 Soil Sampler..... .50

12382. **SAMPLING CLOTH,** 18x18 inches, for receiving soil samples from Soil Samplers. Impervious to moisture..... per dozen 1.50

12386. **SAMPLE CARRYING OUTFIT.** The inconvenience of cumbersome fruit jars and soil bags is done away with in the design illustrated. A neatly finished carrying case, with door and handle, holding one dozen seamless tin cans of one pint capacity, with tight-fitting lids. (See No. 1828.) The suitability of these cans for drying pans makes this an economical outfit, since special pans for the drying oven are not needed. Complete with one dozen cans... 6.50

1828. **SOIL SAMPLE CANS,** Seamless Tin, same style as used in No. 12386.

Capacity, ounces.....	$\frac{1}{2}$	1	2	4	8	16	24
Per dozen.....	.25	.30	.50	.75	1.10	1.75	2.25

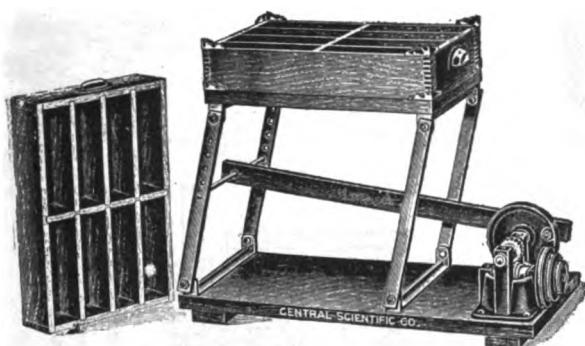
For other **SOIL SAMPLE CANS AND BOXES**, see Boxes.

**SOIL SAMPLE JARS**, see Jars.

**SOIL SCOOPS**, see general heading **Scoops**.

12388. **SHAKER, Chest of Drawers Design**, for preparing soils for mechanical analysis. Essentially as described in Bulletin 84 of the Bureau of Soils, but with hinge mounting. The gearing is of the enclosed type and is arranged to be belted to any  $\frac{1}{4}$  h. p. motor having V-groove pulley. The chest is substantially made of hardwood nicely finished, and has six drawers each with eight compartments for holding No. 12391 Sterilizing Bottles. Complete on a massive hardwood base with forty-eight No. 12391 Sterilizing Bottles, but without motor..... 100.00

For **MOTORS** for use with No. 12388, write for information.



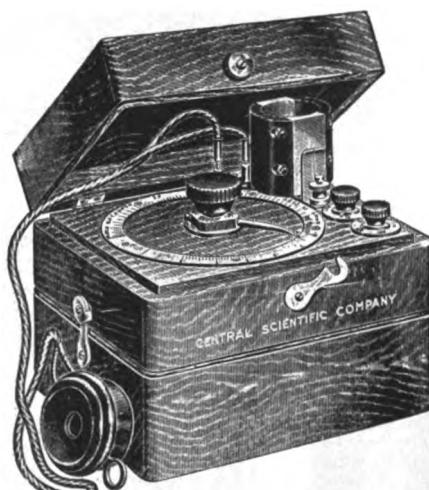
No. 12390.



No. 12391.



No. 12394.



No. 12400.

12390. **SHAKER, Tray Design**, for preparing soils for mechanical analysis. Two trays with compartments for eight bottles each are mounted on a wooden platform attached to a substantial wooden base by four hinged metal supports. The shaking movement is imparted through a worm gear mounted on the same base. Sufficient power will be furnished by a  $\frac{1}{6}$  h. p. motor. The trays are both made removable for convenience in handling and filling. Complete with sixteen bottles, but without motor ..... \$80.00

12391. **BOTTLES, Sterilizer**, for use in Nos. 12388 and 12390. Capacity, 8 oz.....per dozen .90

**SHAKER, Soil Sieve**, see No. 12148.

12394. **SHRINKAGE APPARATUS** for determining the shrinkage of soils, as described in Mosier and Gustafson's "Soil Physics Laboratory Manual," and used at the University of Illinois. This is a tray of brass, 3 inches square at the top, with beveled sides to facilitate removal of the soil sample. In use, a piece of cheese cloth is placed on the bottom of the tray, which is then filled with moist soil. The soil block is then removed from the tray and allowed to dry. The shrinkage in area may readily be determined by measurement..... .45

**SIEVES for Soil Analysis**, see general heading **Sieves**.

## SOIL CONTENT TESTERS

12400. **CONDUCTIVITY BRIDGE**, for determining the soluble salt content of soils; made after designs approved by the U. S. Bureau of Soils.

The use of this bridge depends on the fact that the electric current is conducted by the salt in solution and that the conductance of the solution or, conversely, its resistance to the passage of the current, is determined largely by its concentration. The magnitude of current that will pass is increased by an increase of salt in solution; or the resistance to the passage of the current decreases with the increase of salt. The instrument is of general utility in measuring the resistances of solutions of soils. It is designed primarily for use as a field instrument, and finds its greatest use in determinations of "alkali" or harmful excess of soluble salts, frequently present in the soils of arid and semiarid areas. In survey work it gives a convenient method for determining in the field the percentage of alkali in a soil, so that the mapping may be carried on concurrently. It is also useful in determining the salt content of irrigation and seepage waters.

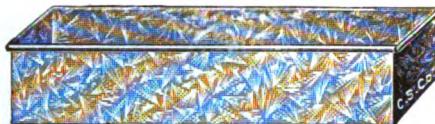
The instrument, by means of which resistances are measured, is a modified form of slide-wire Wheatstone's bridge. In operating the bridge, the cup is filled with the soil saturated with water, and placed in the clips provided for it. The resistance of the cup contents is then read, and from the resistance the amount of soluble salt present determined by reference to the tables given in the Bulletin mentioned above. (See Bulletin 6, U. S. Bureau of Soils.)

Complete as described ..... 250.00

Note.—Bridges of the above type made by us have proved satisfactory to and met the requirements of the U. S. Bureau of Soils, Washington, D. C.

Bridges of this type are used by the Atchison, Topeka & Santa Fe Railway Company for testing the alkali content of their tank water.

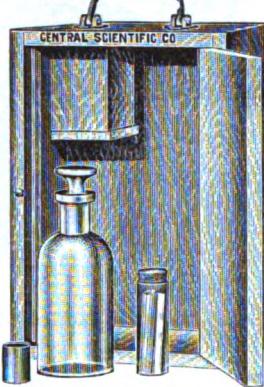
12401. **DRY BATTERY**, complete, as used in No. 12400 Conductivity Bridge..... 1.50



No. 12424.



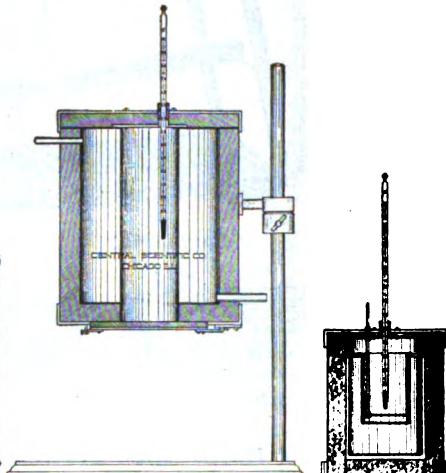
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No. 12420.



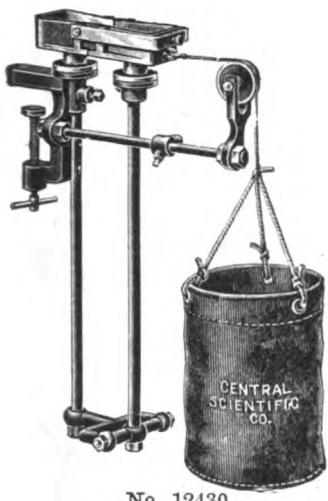
No. F2333.



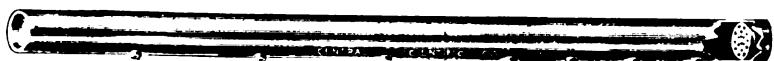
**12404. SOIL ACIDITY TESTER, Truog.** This apparatus is made after specifications by E. Truog of the University of Wisconsin. The principle employed is an entirely new one and indicates clearly not only the presence of soil acidity but the degree of the acidity. Consists of a specially designed Alcohol Heater together with a Graduated Boiling Flask, Brass Measuring Cup, Brass Measuring Spoon, Spatula, and all necessary reagents. The test is completed in from 10 to 15 minutes, and the presence of acidity is shown by discoloration of the white test paper used, and the degree of acidity by the exact color assumed by the paper as compared with a chart of standard colors furnished. A full set of directions giving exact description of the test with all precautions is included. Complete as described, in a neat hard-wood carrying case..... \$9.00

#### Parts for No. 12404.

12405. FLASK, 300 cc capacity, with mark at 100 cc.....	1.00
12406. MEASURING CUP for soil.....	.50
12407. MEASURING SPOON for reagents.....	.15
12408. TEST PAPER, 50 sheets in glass vial..... per vial	.15
12409. SET OF REAGENTS, sufficient for making 50 tests, consisting of a bottle containing 55 grams of a mixture of calcium chloride and zinc sulphide specially prepared, vial of test paper (50 strips), and measuring spoon.....	1.25
F2333. SPECIFIC HEAT APPARATUS (modified design after Prof. A. G. McCall) for determining the Specific Heat of Soils; may also be used for determining the specific heat of any substance. Consists of a double-walled heater or steam jacket with large rectangular base and support rod, and a double-walled calorimeter. Both heater and calorimeter are of very substantial construction, and are well insulated. The heating chamber extends through the heater and is closed at both ends with heavy insulated covering. The top cover has two openings, one for a thermometer, and the other for suspending the sample to be tested. The clamp which holds the heater rests on a collar which is clamped to the support rod, so that when the sample has come to a constant temperature the lower cover of the heater can be swung back out of the way and the heater rapidly swung around to a position over the calorimeter. The transfer of the specimen from heater to calorimeter can thus be readily and quickly effected. Heater and calorimeter complete as described, but without thermometers.....	45.00
F2334. CALORIMETER only of No. F2333 without thermometers .....	15.00
12420. TANK for holding water, of galvanized iron, 12 inches in diameter, with drop handles, for use with all soil tubes 14 inches long, or under (e. g., No. 12492).....	2.50
12422. TANK for holding water, of galvanized iron, 12 inches in diameter. For use with soil tubes 36 inches long, or under; made especially for Nos. 12444 Tube.....	.50
12424. TANK for holding water, of galvanized iron, 26x6x6 inches. For use in all capillarity experiments. Used with Tubes Nos. 12444-12464.....	2.50



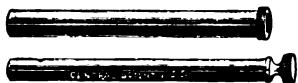
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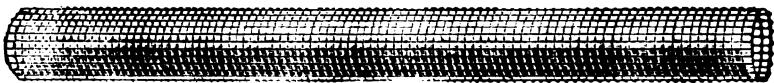
No. 12444.



No. 12448.



No. 12445.



No. 12454.

12430. **TENACITY OF SOILS APPARATUS**, for determining the tenacity of moist soils. In this new and improved design, which has been developed from the original in use at the University of Illinois, the inaccuracies due to friction, caused particularly by a collection of dirt on the moving parts of the instrument, have been completely obviated, and constant conditions thereby assured. Two brass soil containers are supported on a hinged frame which in turn is securely clamped to the table top. The soil containers are removable from the frame and are so constructed that they may be immediately replaced in exactly the same relative position. In use, the containers are held firmly together by means of the metal stirrup shown in the illustration; the moist soil is compacted in the containers and smoothed level with the top, thus leaving one square inch section for testing. Weights are now placed in the hanger sufficient to pull the soil apart. Complete, as illustrated, with canvas hanger, but without weights ..... \$20.00

**THERMOMETERS, Soil**, see general heading Thermometers.

12436. **TRAYS, Drainage**, for showing effects of drainage on temperature of soils. Two water-proofed wooden trays, each 3 ft. x 4 ft. x 6 inches deep, one made water tight, the other provided with drainage ..... per set 25.00

12438. **TRAY, Puddling**, for mixing and working soils. Water tight, waterproofed wooden tray, 25 inches x 25 inches x 2 $\frac{1}{4}$  inches. Will not warp ..... 6.00

**TUBES, SOIL, ALL KINDS**

12444. **TUBE, Capillarity, McCall**, with side tubes for studying the distribution of moisture in vertical columns of soil; also for determining the lateral movement of capillary moisture. Of brass, 36 inches long by 2 inches in diameter, with perforated bottom and small lateral tubes at definite intervals ..... 4.00

12445. **TUBE, Sampling**, for use in obtaining samples from the side openings of No. 12444 Capillarity Tube as suggested by Prof. John A. Slipher of Purdue University. A brass tube with diameter slightly contracted at the sharpened end is provided with a plunger by which the sample of soil may be ejected ..... 1.50

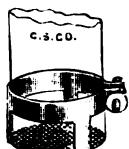
12448. **TUBE, Capillarity, McCall**, for determining the rate of the capillary rise of water in soils. Of brass, 36 inches long by 2 inches in diameter, with perforated bottom. Running lengthwise of the tube is a slot fitted with a window of thin celluloid through which the moisture height may be noted. The construction of this tube is such that an additional length, which the illustration shows in place, may readily be attached. Without additional length ..... 4.75

12450. **TUBE, Extension**, with coupling for studying rise of moisture to greater height than is possible with No. 12448 alone. Of brass, 36 inches long.  
With coupling ..... 5.50

12451. **CELLULOID STRIP**, 36x3 inches, for either No. 12448 or No. 12450 ..... .60

12454. **TUBES, Capillarity**, of celluloid protected by wire gauze. These tubes consist of a cylinder of galvanized iron wire gauze 2 inches in diameter, surrounding a cylinder of thin transparent celluloid formed of a strip of celluloid sufficiently wide to go 1 $\frac{1}{2}$  times around the tube. These tubes are soil tight, transparent, and durable, and are very satisfactory for studying the distribution of water in capillary rise experiments, since the inner tube may be withdrawn and unrolled, exposing the soil for easy sampling.

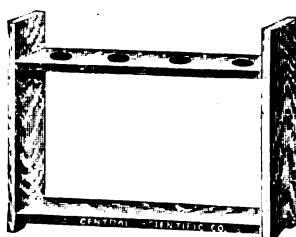
Length, inches.....	12	24	36	48
Each .....	1.40	1.90	2.50	3.40



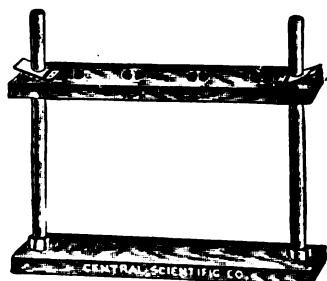
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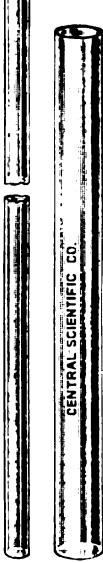
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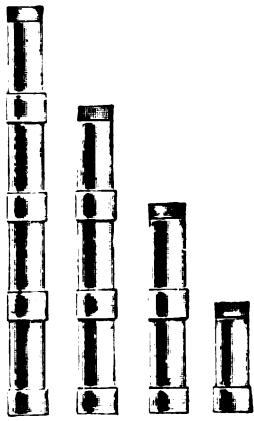
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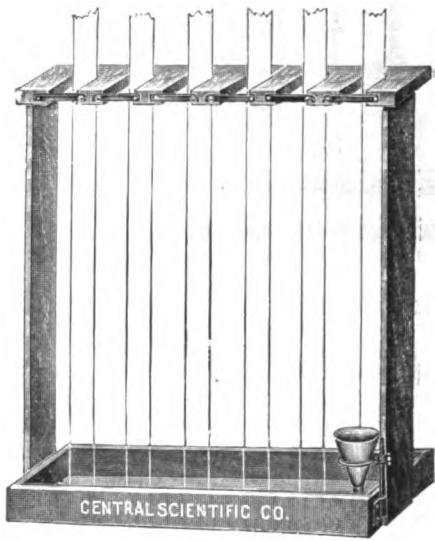
No. 12472.



No. 12464.



No. 12458.



No. 12462.

## 12455. CELLULOID STRIPS for No. 12454 Tubes.

Length, inches .....	12	24	36	48
Each .....	\$0.18	.38	.54	.96

For CLEANING BRUSH, see No. 1876, on page 193.

For SUPPORT, see No. 12462.

12458. TUBES, Capillarity, Sectional, for determining capillary rise of water in soils. These sections are made of heavy brass tubing and are 8 inches long by  $1\frac{1}{4}$  inches in diameter. Each section is threaded at both ends to receive brass couplings so that the tubes may be built up to any desired length. The tubes may readily be cleaned, and the breaking of the soil column which causes so much annoyance in long brass and glass tubes is obviated, because the section joints, which are tight enough to prevent evaporation losses from the soil, are loose enough to permit equalization of air pressure inside and outside of tube. (For Bottom Tube, see No. 12459 below) ..... Per section (with one coupling) 1.25

12459. BOTTOM TUBE, for No. 12458 with perforated bottom. For use as lowest tube of set.. 1.50

12462. CAPILLARITY TUBE SUPPORT for supporting 2-inch tubes 32 inches long or longer in a vertical position. Will hold six tubes which may be readily removed or put in place. The base is constructed in form of a tray and holds a water-tight zinc tank. A rod and ring at the side of the tray is designed to hold an inverted flask so that the height of the water in the tray may be kept constant. Complete as illustrated, but without flask or tubes.. 9.00

12464. TUBES, Capillarity, Glass.

Diameter, inches.....	2	2	2	1
Length, inches.....	8	12	15	24
Each .....	.25	.35	.40	.80

12465. PERFORATED BOTTOM for 2-inch Glass Soil Tubes. May be used with tubes from  $1\frac{1}{2}$  inches to  $2\frac{1}{4}$  inches in diameter. Clamps firmly to the bottom of the tube, but may readily be removed for changing from one tube to another .....

For CLEANING BRUSH, see No. 1876.

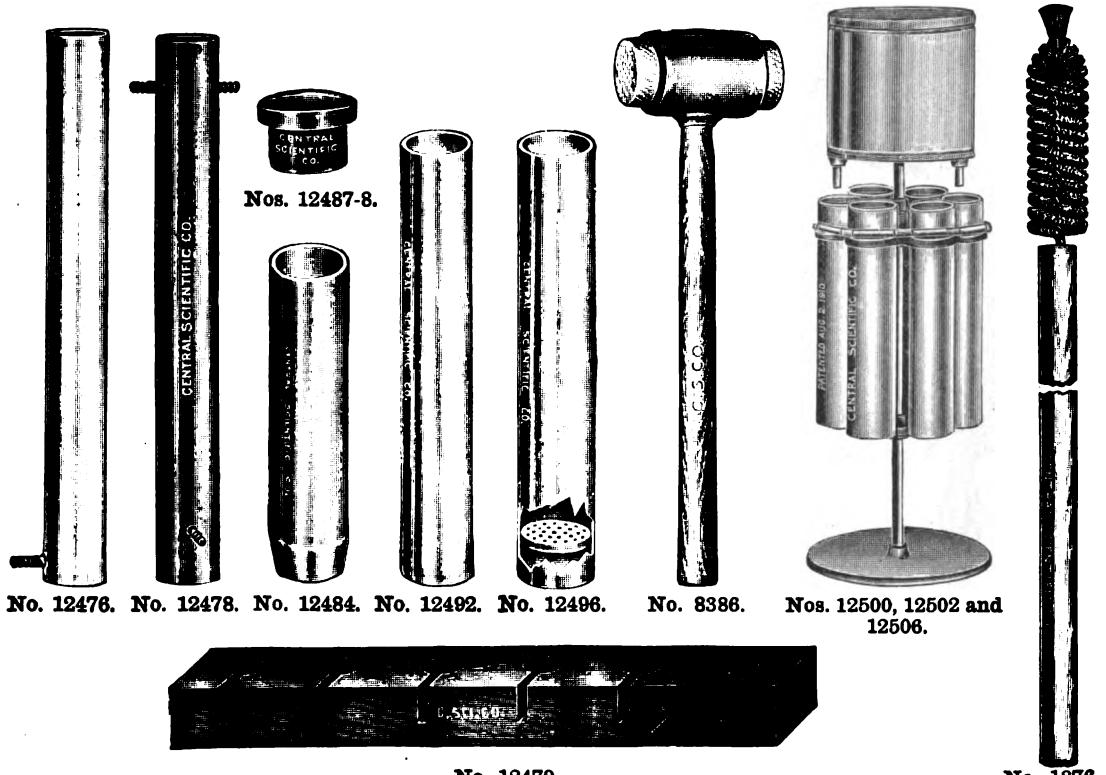
2818. CAPILLARITY TUBES, Glass, student's lamp chimney form..... per dozen 2.05

12468. SUPPORT, of wood, for holding four No. 2818 Capillarity Tubes..... 2.30

12472. SUPPORT, for four No. 2818 Capillarity Tubes, more substantial than No. 12468. Base of wood with metal uprights and adjustable shelf for supporting tubes; finely finished..... 2.50

F3355. TUMBLERS, for use with No. 2818 Tubes;  $\frac{1}{2}$ -pint size .....

per dozen .80

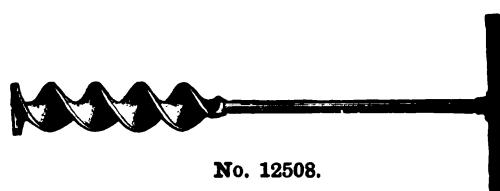


## For ORGANIC MATTER TUBES, see No. 12464.

12476. TUBE, Percolation of Air, for comparing the rate of the flow through soils. Made of brass, 18 inches long by 2 inches in diameter, with outlet tube near bottom.....	<b>\$2.75</b>
12478. TUBE, Percolation of Water, for determining the rate of percolation of water through soils. Of brass, 18 inches long by 2 inches in diameter, with lateral inlets and drainage tube, and with solid bottom below and perforated bottom above drainage tube.....	<b>2.75</b>
12479. SUPPORT BLOCK, for use with No. 12478 Percolation Tube. This block is necessary when several soils are to be compared.....	<b>1.90</b>
For CLEANING BRUSH, see No. 1876.	
12484. TUBE, Specific Gravity, for determining the apparent specific gravity of surface soils under field conditions. Of steel, 12 inches long by 3 inches outside diameter, with cutting edge	<b>5.00</b>
12486. TUBE, Specific Gravity, same as No. 12484, but 4 inches inside diameter.....	<b>10.00</b>
12487. DRIVING HEAD, of cast iron, for use with No. 12484 Specific Gravity Tube to prevent battering the upper edge when the tube is driven into the ground.....	<b>.60</b>
12488. DRIVING HEAD, same as No. 12487, but for use with No. 12486 Tube.....	<b>2.25</b>
8386. MAUL for driving No. 12484 Specific Gravity Tube. Substantially made of iron with hardwood faces. The handle is two feet long, and the Maul is sufficiently heavy for its purpose, without being clumsy.....	<b>1.40</b>
12492. TUBE, Volume Weight, for determining volume weight and pore space. Of brass, 12 inches long by 2 inches in diameter, with solid bottom, and crease one inch from the top.....	<b>1.50</b>
12494. TUBE, Volume Weight, for elementary work, of brass, $1\frac{1}{2} \times 3\frac{1}{2}$ inches.....	<b>.65</b>
12496. TUBE, Water Holding Capacity, brass, 12 inches long by 2 inches in diameter, with perforated bottom, $1\frac{1}{2}$ mm perforations, and crease one inch from top.....	<b>1.50</b>
1876. TUBE BRUSH, for cleaning soil tubes of 2 inch diameter; has a wooden handle 3 feet long and is provided with a tuft of bristles at the end for reaching the bottom corners of the tube	<b>.80</b>
12500. TUBES, Soil, so constructed that one style of tube may be used for all experiments. They are made from brass tubing 10 inches long and 2 inches in diameter. A cast brass base, which is corrugated on its upper surface, is soldered into the bottom of the tube. On the lower surface of this casting is a connection for rubber tubing. A brass disk with circular perforations, and somewhat smaller than the inside of the soil tube, is dropped to the bottom of the tube and rests on the corrugated surface of the brass base, allowing free passage of air or water through the tube. The tubes are so constructed that they can be connected in series by means of rubber tubing so that a constant water level may be obtained in all the tubes. Each .....	<b>2.00</b>



No. 12512.



No. 12508.



No. 12568.



No. 12573.



No. 12576.



No. 12578.

12502. **TUBE RACK** for 6 No. 12500 Soil Tubes. The tube rack consists of a cast iron base, smoothly finished and japanned, to which is attached an upright standard. On this standard are carried two castings, the lower one being arranged to take and hold the lower ends of the soil tubes by means of lugs on its upper surface, and the upper consisting of a series of rings to support the upper ends of the soil tubes in a concentric position. This arrangement holds the tubes securely, but still allows them to be removed or replaced very easily. At the same time it is compact, the rack and tubes occupying less than one square foot of desk room..... \$3.00  
(For illustration, see page 193.)

12506. **SUPPLY TANK**, used in determining the comparative rate of flow of water through various soils. This tank is made of polished brass and rests on the top of the standard of the tube rack by means of a socket in its base. Two short brass tubes extend downward from the base of the tank in such a position as to fall within the two soil tubes on opposite sides of the rack. The six soil tubes having been connected in series, the water flows from the tank to the soil tubes, maintaining a constant water level therein..... 4.00  
(For illustration, see page 193.)

12508. **SOIL TUBE AUGER** for removing wet soil from tubes. This auger is  $1\frac{1}{4}$  inches in diameter, of twist pattern and made from polished cast steel. Will clean tubes to the bottom..... 5.00

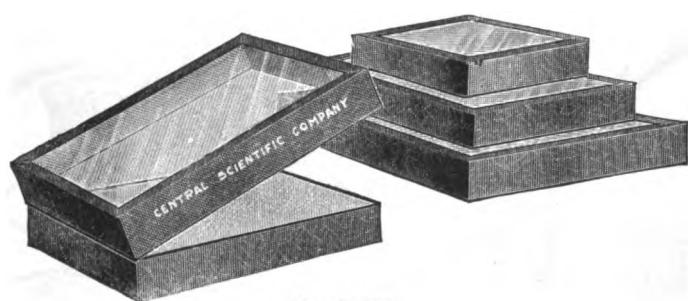
12512. **WATER RETENTION CUP**, for determining the maximum water retained by soil. Of brass 2 inches in diameter by  $\frac{1}{8}$  inch high, with diaphragm of perforated metal fastened about  $\frac{1}{16}$  inch below top. This cup is used in studying the wilting point by means of the direct relationship which exists between the maximum water retained by any soil and the wilting point. (See Hilgard's "Soils," page 209)..... .60

12568. **SPATULAS, Horn**, double, with spatula on each end.  
Length, mm ..... 100 125 150 200  
Each ..... .14 .16 .20 .36

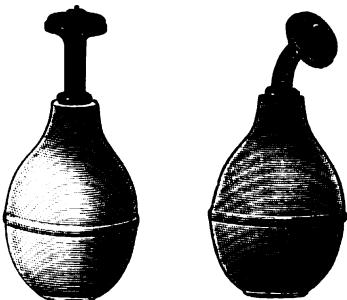
12573. **SPATULAS, Porcelain**, double, with spatula at each end.  
Length, mm ..... 105 120 150 195 212 225  
Each ..... .25 .35 .42 .55 .72 .85

12576. **SPATULAS, Steel, Flexible**, with cocoa wood handle.  
Length of blade, inches ..... 3 4 5 6 8 10 12  
Each ..... .36 .40 .45 .50 .66 1.10 1.80

12578. **SPATULAS, Steel, Very Flexible**, with narrow point for weighing, and wood handle.  
Length of blade, inches ..... 3 4 5 6 8 10 12  
Each ..... .50 .70 .80 .90



No. 12588.



No. 12754.

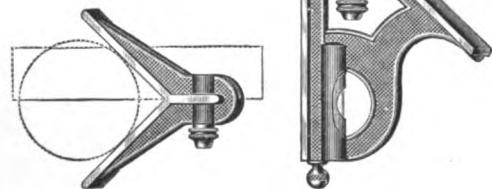
No. 12756.



No. 12722



No. 12742.



No. 12768.



No. 12736.



No. 12698.

12588. **SPECIMEN MOUNTS**, Riker's, suitable for mounting insects, butterflies, fungi, shells, etc., or thick bulbs or plants too large for the Botanical Mounts, No. 1556.

Size, inches	$2\frac{1}{2} \times 3$	$3\frac{1}{4} \times 4\frac{1}{2}$	$4 \times 5$	$5 \times 6$	$6\frac{1}{2} \times 6\frac{1}{2}$	$6\frac{1}{2} \times 8\frac{1}{2}$	$8 \times 12$	$12 \times 16$
Each	\$0.15	.20	.20	.25	.30	.30	.50	1.00
Per dozen	1.75	2.10	2.80	3.50	3.50	6.00	12.00	

12698. **SPEED INDICATOR**, improved form, may be run at highest speed required without heating; dial plate has two rows of figures reading right or left; rubber tips for both pointed and centered shafts, which not only remove the jar and run smoothly, but produce a stronger frictional contact with the shaft. The rotating disk, being carried by friction, may be moved to the starting point where the raised knob coincides. Pressing the raised knob on the rotating disk with the thumb prevents the disk from moving until the hand of the watch gets to the right position to take the time. Every hundred revolutions may be noted by feeling the knob pass under the thumb, thus relieving the eye which has only to look on the watch to note the time. Nickel-plated ..... 1.50

12718. **SPONGES**, for cleaning purposes, 16 to a pound ..... per pound 2.00

12722. **SPOON**, Aluminum, table size, handle with ribbed center ..... .25

12736. **SPOONS**, Horn, with spatula end.

Length, mm.	100	150	200
Each	.20	.30	.40

12742. **SPOONS**, Porcelain, with spatula end.

Length, mm.	96	120	140	160	200	247	490
Each	.21	.27	.38	.50	.75	.85	2.75

12754. **SPRINKLER**, Rubber, bulb of extra quality, 8 ounce size, with straight neck..... 1.10

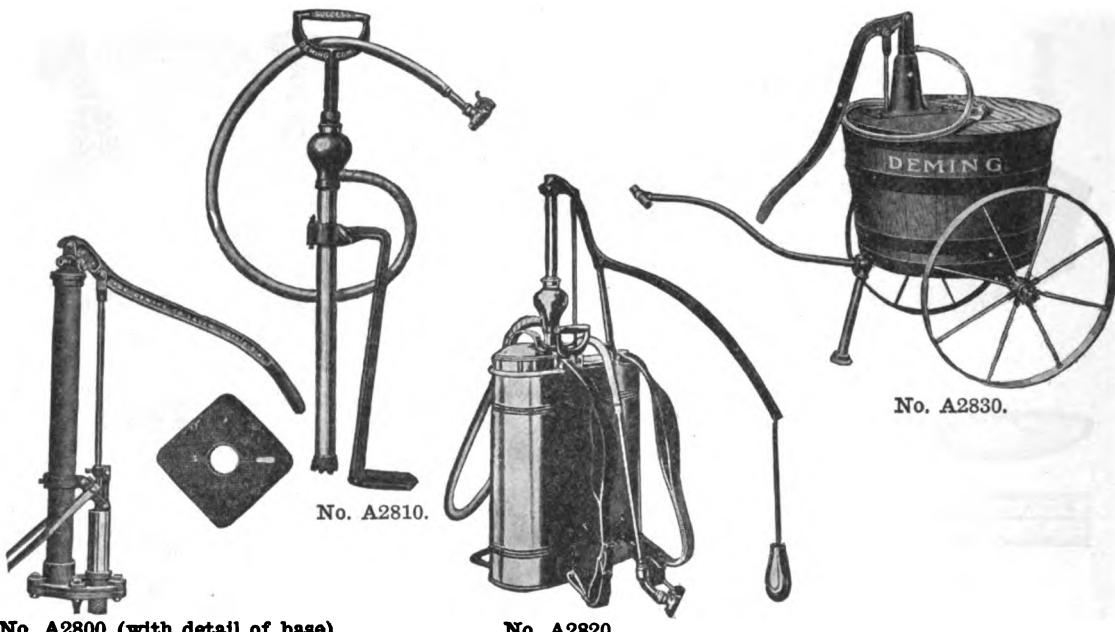
12756. **SPRINKLER**, Rubber, same as No. 12754, but with bent neck..... 1.20

**SPROUTING APPARATUS**, see **Grain Testing Apparatus**.

12766. **SQUARE**, all steel, nicely polished, length 2 feet, width 2 inches, face marked in 4ths, 8ths, and 16ths of inches, back in 4ths and 12ths of inches, with board and brace measure.. 2.50

12768. **SQUARE**, Combination. The equivalent of a set of try squares, a depth gage, a level, a mitre, and, with the auxiliary center head, a centering square, both inside and outside. Convenient for transferring exact measurements, laying out work, or squaring in a mortise. Twelve inch blade graduated on one side in  $\frac{1}{2}$  mm and 32nds of inches; on the other in millimeters and 64ths of inches. Complete, with center head and level..... 3.00

For other **Squares**, see page 198.



### SPRAYING APPARATUS

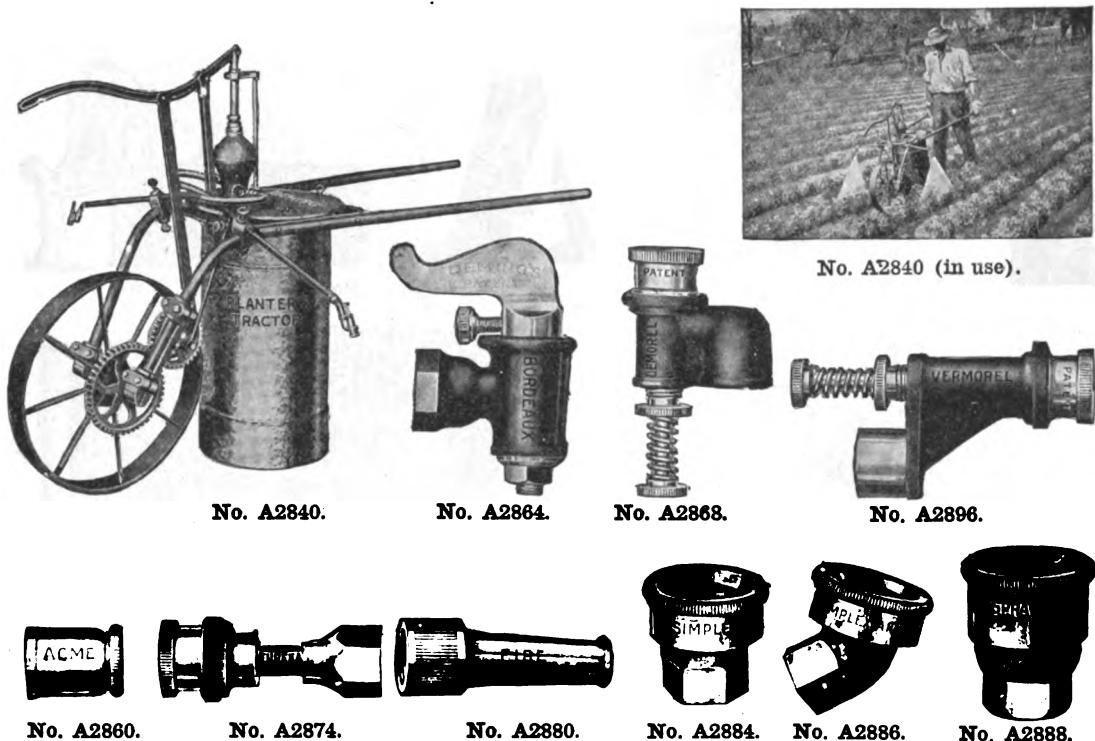
A2800. **BARREL SPRAYER.** The pump has a brass tube cylinder  $2\frac{1}{4}$  inches in diameter with 4-inch stroke, brass ball valves, cage and seat. It sits low in the barrel so that the cylinder is submerged. The iron base for mounting the pump on the head of barrel is adjustable and fits a hole  $10 \times 10$  inches. This sprayer is fitted with air chamber, gauze suction strainer, agitator of the twin paddle type, and brass discharge Y, but without hose or nozzle (see No. A2801). \$13.40

A2801. **HOSE AND NOZZLE** for No. A2800. 12 $\frac{1}{2}$ -foot section of  $\frac{1}{2}$ -inch sprayer hose with couplings and No. A2884 Simplex Nozzle. 4.50

A2810. **BUCKET SPRAYER** for general spraying in the garden, green house, and small orchard. The working parts and cylinder are of brass, so that corrosion and rust are eliminated. The air chamber, which is the globe shaped enlargement seen in the illustration at the top of the cylinder, is of cast brass and causes ease of motion and discharge of a steady stream. The handle and foot rest are made of malleable iron, which is unbreakable, and the latter being 15 inches long, is suitable for use with any tall bucket. Complete with No. A2864 Bordeaux Nozzle and 3 feet of  $\frac{3}{8}$ -inch hose. 5.30

A2820. **KNAPSACK SPRAYER** for general spraying purposes. The working parts of the pump are the same as described under No. A2810, so that corrosion and rust are eliminated. The lever is of wrought iron with malleable iron link, steel rod and wood handle. The tank is of 5 gallons capacity and is made of brass with wide shoulder straps. It is provided with a drip cup to take care of possible leakage, a gauze strainer under the filling hole, and a wide footrest so that it may be used as a bucket pump. Complete with No. A2864 Bordeaux Nozzle and 5 feet of  $\frac{3}{8}$ -inch hose, with discharge pipe and undersprayer. 20.00

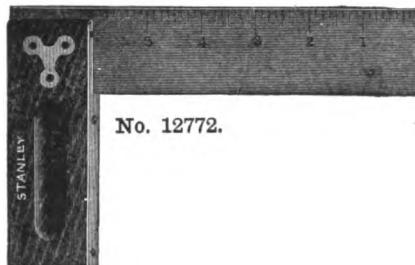
A2830. **TANK SPRAYER.** This is one of the most convenient outfits for general use. Consists of a 24-gallon wood tank with steel hoops and hinged wood top, mounted on a cart with 24-inch metal wheels having staggered spokes and 2-inch tires; leg, tongue and handle of wrought iron pipe; height to top of tank 30 inches; to top of pump 42 inches. The working parts are of brass and since the leverage is six to one, the pump may readily be worked against a pressure of 125 pounds. The air chamber is ample and the agitator, which is of the twin paddle type, is simple and effective and stirs the liquid thoroughly. Complete with No. A2864 Bordeaux Nozzle and 6 feet of  $\frac{1}{2}$ -inch discharge hose. 30.00



**A2840. TRACTOR SPRAYER.** This is a spraying outfit of the wheelbarrow type and may readily be operated by one man. The tank has a capacity of 12 gallons and the entire sprayer, although built for durability, is as light in weight as is consistent with the proper strength. All parts of the pump coming in contact with the liquid are of brass, thus doing away with corrosion. The pump has a  $1\frac{1}{2}$ -inch cylinder with 4-inch stroke and is provided with an agitator for the spraying liquid. The handles are of wrought iron pipe bent to shape and are connected rigidly by channel iron for holding the tank. The wheel is 20 inches in diameter with tire  $2\frac{1}{2}$  inches wide. As shown in the illustration, the pump is worked by gear wheels, the main gear being attached to the main wheel and the operating gear being so arranged that it may be thrown out of mesh when it is desired to move the sprayer without spraying. This sprayer is especially efficient for spraying two rows of field crops, as shown in the small illustration, and is provided with two sections of  $\frac{3}{8}$ -inch hose 2 feet long, two  $\frac{3}{8}$ -inch stop-cocks, two  $\frac{1}{4}$ -inch hose pipes 18 inches long, and No. A2868 Demorel Nozzles with angle discharge. Complete with galvanized tank of 12 gallons capacity ..... \$32.50

A2841. TRACTOR SPRAYER, same as No. A2840, but with brass tank.....	47.50
A2860. NOZZLE, Acme, for throwing a solid stream or fine spray.....	.40
A2864. NOZZLE, Bordeaux. This is an excellent general purpose spray nozzle and throws a solid stream, coarse long-distance spray, or a fine mist, or it may be shut off altogether. Suitable for general spraying, whitewashing, disinfecting, etc. .....	1.05
A2868. NOZZLE, Demorel, with caps for fine and coarse sprays, suitable for kerosene sprayers..	.75
A2874. NOZZLE, Eureka, for throwing a conical shape spray. Especially suitable for whitewashing	.60
A2880. NOZZLE, Fire, for fire protection, washing windows, buggies, etc. .....	.40
A2884. NOZZLE, Simplex. Light and durable in construction and adapted for high pressure; has two interchangeable steel spray disks, one coarse and one medium fine.....	.60
A2886. NOZZLE, Simplex Angle, same as No. A2884, but with angle connection.....	.55
A2888. NOZZLE, Spramist. Similar to No. A2884 Nozzle, but with cup-shaped removable strainer	.95
A2896. NOZZLE, Vermorel, similar to No. 2868 Nozzle, but somewhat heavier in weight.....	.65

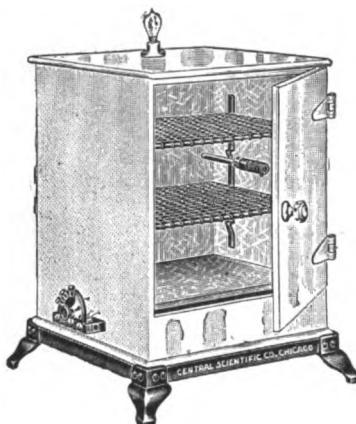
For Insecticides for use with above, see page 90.



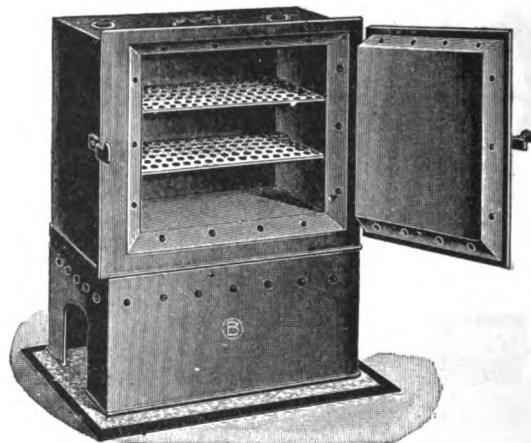
No. 12772.



No. 12796.



Nos. 12820-21.



No. 12826.

**12772. SQUARES, Try,** blued steel blade graduated in 8ths of inches, and rosewood handle.

Size, inches .....	6	9
Each .....	\$0.75	.90

For other Squares, see page 195.

**12794. STENCIL FIGURES.** Each figure has a beaded lock on its edge so that the figures can be joined together, permitting the use of combinations of figures at one time instead of single figures. Complete set of one-inch numbers from 0-9, dollar mark, cent mark, beginner, ender and period .....

.60

**12796. STENCIL LETTERS.** Same style as No. 12794. Complete set of one-inch letters from A to &, with beginner and ender, period, apostrophe, comma and blank..... **1.40**  
**STERILIZERS, Hot Air, DeKhotinsky Electrically Heated and Regulated, Single Wall,** designed to supply the need for a moderate priced sterilizer with dependable temperature control and uniform temperature throughout. For full description and details of construction and control, see No. 9846 Drying Ovens.

	Width, Inches	Depth, Inches	Height, Inches	Vol. Inside, Cu. Inches	Shelf Space, Sq. Inches	Voltage A.C. & D.C.	Price
12820.	11	10	12	1320	220	110	<b>60.00</b>
12821.	11	10	12	1320	220	220	<b>62.50</b>

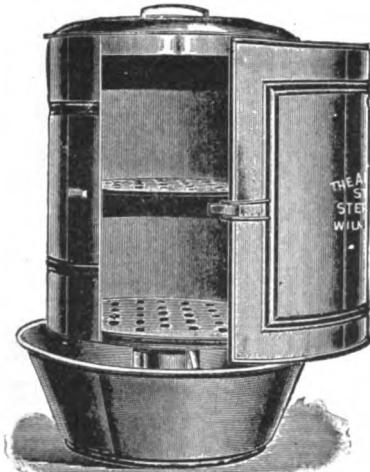
**STERILIZERS, Hot Air, DeKhotinsky Electrically Heated and Regulated, Single Wall,** of same construction as No. 12820, but larger, with two doors and with twelve 115 watt heating units. With same equipment as No. 12820.

	Width, Inches	Depth, Inches	Height, Inches	Vol. Inside, Cu. Inches	Shelf Space, Sq. Inches	Voltage A.C. & D.C.	Price
12822.	18	12	14	3024	430	110	<b>90.00</b>
12823.	18	12	14	3024	430	220	<b>92.50</b>

**12826. STERILIZERS, Hot Air, Double Wall,** of sheet iron, with enclosed base, asbestos mat, and perforated shelves. Without burner.

No. .....	A	B
Height inside, inches.....	9	10
Width inside, inches.....	9	12
Depth inside, inches.....	6	10
Height over all, inches.....	19½	21½
Number of shelves.....	1	2
Each .....	20.00	<b>28.50</b>

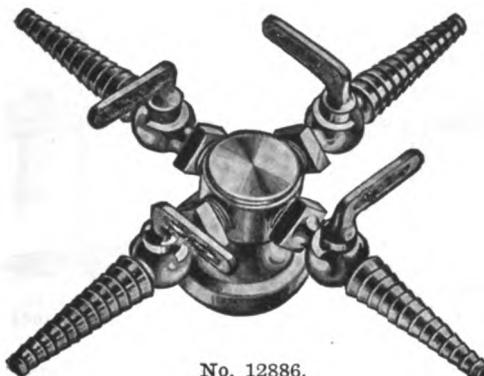
For **BURNERS** for use with No. 12826, see Nos. 2108 and 2220.



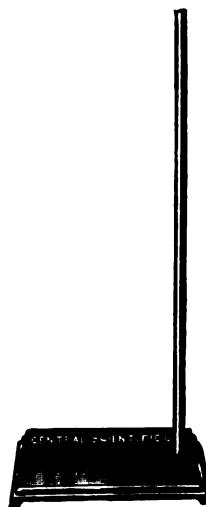
Nos. 12846-7.



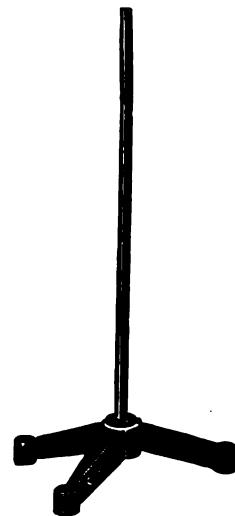
No. 12884.



No. 12886.



No. 13036.

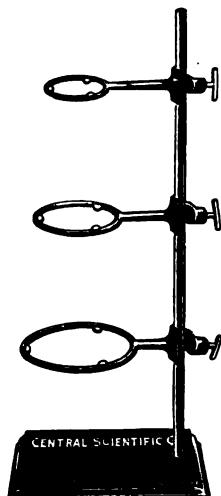


No. 13038.

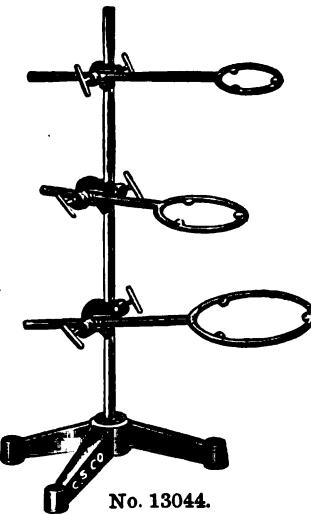
**STERILIZERS,** Arnold Steam, with side door and two removable perforated disks. These sterilizers are well known for their compactness and economy. They maintain the unvarying temperature of boiling water in all parts of the sterilizing chamber.

No.	A	C	D
Height, inches.....	7½	11½	12½
Diameter, inches.....	8½	10½	10½
12846. Made of heavy tin, copper bottom.....	\$9.00	11.00	12.50
12847. Made of copper.....	18.00	27.50	29.50
12884. STOP-COCK, Brass, for gas, single, nickel-plated. Especially suited for laboratory use. The nipple is 2½ inches long, tapering from ¾ inch diameter at the valve to ¼ inch diameter at the end. The serrations prevent rubber tubing from slipping off. With ¾ inch iron pipe male thread .....			.80
12885. STOP-COCK, Brass, two-way, consisting of two No. 12884 Single Stop-Cocks, with flange.	2.50		
12886. STOP-COCK, Brass, four-way, consisting of four No. 12884 Single Stop-Cocks, with flange.	4.00		
13036. SUPPORTS, Iron, rectangular base, with coppered steel rod.			

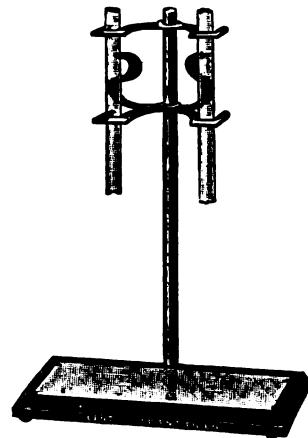
No.	A	B	C	D
Size of base, inches.....	4x6½	5x8	5½x9	6x11
Length of rod, inches.....	18	20	24	36
Diameter of rod, inches.....	5/16	5/8	1/2	1/2
Each .....	.50	.67	1.05	2.00
13038. SUPPORTS, Iron, tripod base, with coppered steel rod.				
No.	A	B	C	D
Length of leg, inches.....	4 1/4	5 1/4	6 1/2	7 1/2
Length of rod, inches.....	18	20	24	36
Diameter of rod, inches.....	5/16	5/8	1/2	1/2
Each .....	.50	.70	1.20	1.90



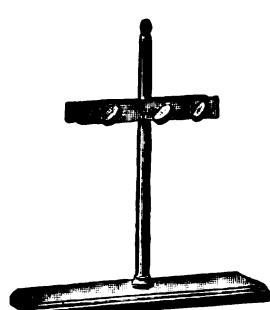
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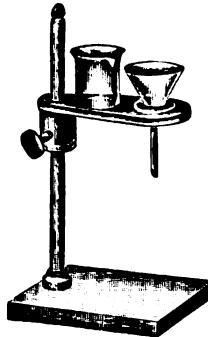
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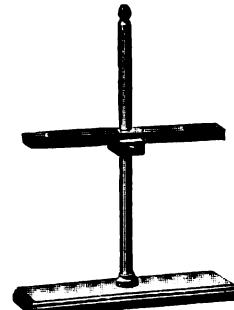
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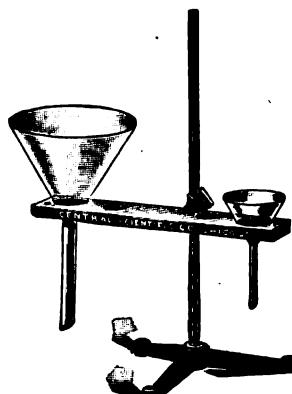
No. 13060.



No. 13094 (in use).

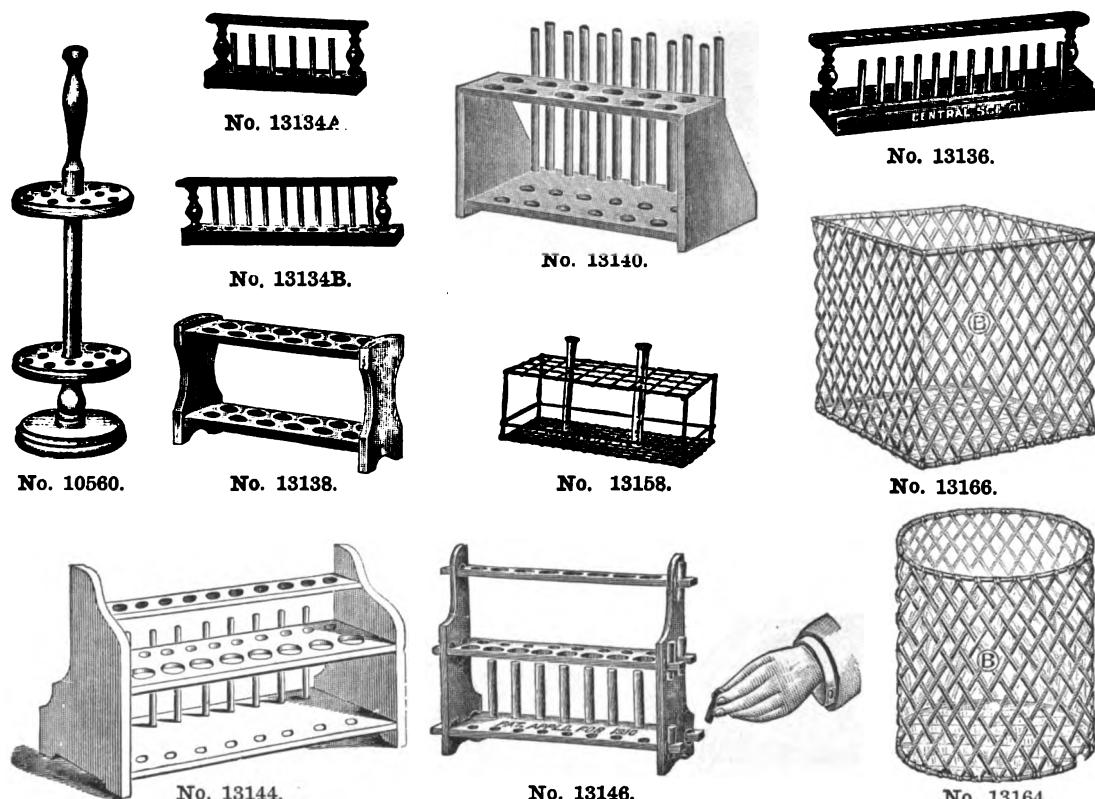


No. 13096.



No. 13100 (mounted).

13040. SUPPORTS, Iron, rectangular base, consisting of Support No. 13036, with Rings No. 11502.			
No. ....	A	B	C D
Number of rings.....	2	3	4 4
Diameter of rings outside, inches.....	3.4	3.4.5	3.4.5.6 3.4.5.7
Each .....	\$0.90	1.25	1.90 2.90
13042. SUPPORTS, Iron, tripod base, consisting of Support No. 13038 with Rings No. 11502.			
No. ....	A	B	C D
Number of rings.....	2	3	4 4
Diameter of rings outside, inches.....	3.4	3.4.5	3.4.5.6 3.4.5.7
Each .....	.70	1.10	1.70 2.60
13044. SUPPORT, Iron, tripod base, consisting of No. 13038B, with one each Extension Rings No. 11504, 3, 4 and 5 inches, and 3 No. 2914 Clamp Holders. Complete as illustrated.....	2.20		
13058. SUPPORT, Burette, hardwood, with cork-lined clamp, for one burette. Length of rod, 16 inches .....	1.70		
13060. SUPPORT, Burette, hardwood, same as No. 13058, but for two burettes.....	2.90		
13072. SUPPORT, Burette, hardwood, Chaddock's, improved form. The rod and base are of polished hardwood. On top of the base is a rectangular piece of white glass. The clamp is of spring brass, which holds the burette firmly in place without danger of breakage. The burette is readily placed in position or removed by simply pushing back the brass spring. For two burettes .....	4.00		
13094. SUPPORT, Funnel, hardwood, for one funnel, with arm large enough to accommodate beakers. Height of rod, 16 inches.....	1.60		
13096. SUPPORT, Funnel, hardwood, for two funnels .....	1.50		
13098. SUPPORT, Funnel, hardwood, similar to No. 13096, but for four funnels, and with holes slotted enabling funnels to be removed from the side .....	1.70		
13100. SUPPORT, Funnel, hardwood, with iron clamp for attachment to support stand. With slotted holes for four funnels. Without support stand .....	.60		



10560. SUPPORT, Pipette, hardwood, revolving, for 12 pipettes..... \$5.00  
 13134. SUPPORTS, Test Tube, hardwood, with heavy base and drying pins.

No. ....	A	B
For tubes .....	6	10
Each .....	.40	.50

13136. SUPPORT, Test Tube, hardwood, Griffith's, similar to No. 13134, but with trough in base for draining, or for holding stirring rod, pipettes, etc. With 10 holes for  $\frac{3}{4}$  inch tubes, 2 for 1 inch tubes and 12 drying pins..... .50

13138. SUPPORTS, Test Tube, hardwood, for twelve tubes in two rows.

No. ....	A	B
Diameter of holes, inches.....	$\frac{7}{8}$	$1\frac{1}{8}$
Each .....	1.20	1.30

13140. SUPPORT, Test Tube, hardwood, for 12 tubes in two rows with 12 drying pins. Diameter of holes,  $1\frac{1}{8}$  inches..... 1.80

13144. SUPPORTS, Test Tube, hardwood, with two shelves, and drying pins.

No. ....	A	B
For test tubes.....	13	25
Each .....	.50	.80

13146. SUPPORT, Test Tube, hardwood, without glued joints, shipped knocked down, with directions for putting together; for 16 tubes, with 8 drying pins ..... 1.30

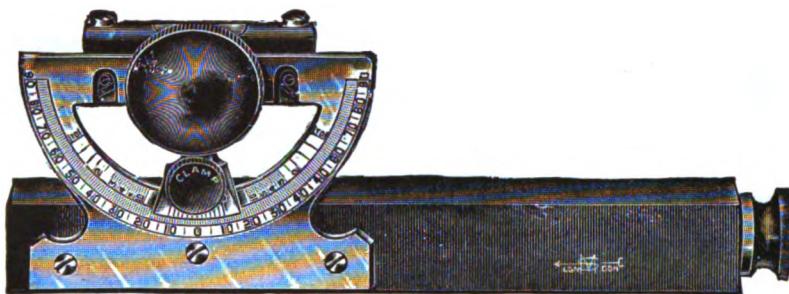
13158. SUPPORT, Test Tube, tinned iron wire. Will hold 40 tubes. Size,  $9\frac{1}{2}$  inches long by  $4\frac{1}{2}$  inches wide by  $3\frac{1}{2}$  inches high..... .85

13164. SUPPORT, Test Tube Basket, tinned iron wire, cylindrical form, for sterilizing and incubating culture tubes. Diameter, 6 inches; height, 6 inches..... 1.00

13166. SUPPORTS, Test Tube Basket, tinned iron wire, rectangular form.

No. ....	A	B
Height, inches.....	6	$5\frac{1}{2}$
Width, inches.....	6	4
Length, inches.....	6	5
Each .....	1.20	.90

13168. SUPPORT, Test Tube Basket, tinned iron wire, rectangular form, with partition in the middle. Length,  $8\frac{1}{2}$  inches; width, 5 inches; height,  $5\frac{1}{2}$  inches..... 2.20



No. 13182.



No. F2625.



No. 13202.



No. 13190.

## SURVEYING INSTRUMENTS, SIMPLE TYPE FOR FARM SURVEYING, FORESTRY AND GEOLOGICAL WORK

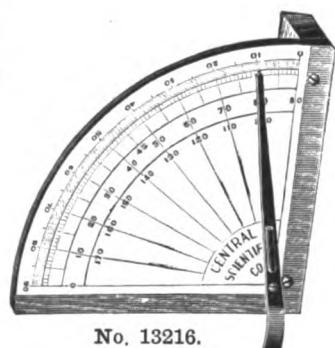
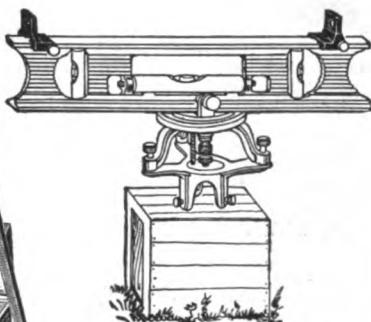
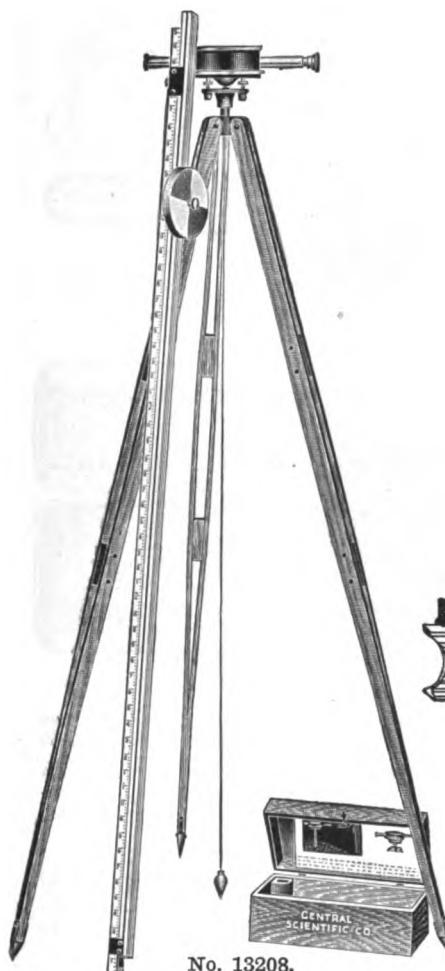
**BAROMETERS**, see general heading **Barometers**.

**13182. CLINOMETER**, Abney's Reflecting Level or Pocket Altimeter, for measuring the height of buildings, trees, hills, etc., and also for fixing the slopes for railroads, the rise and fall of ground for drainage purposes, and all operations where angular distance or inclination of surface is desired. Sighting tube 5 inches long, large German silver arc, extra long draw eye-piece, improved fixing clamp to vernier. The arc has two graduated scales upon it, one giving the angular measurements by degrees, and subdivided to 5 minutes by the vernier divisions on the index. The other scale is figured 1 to 10 with their subdivisions. Complete in leather case, with directions..... \$15.00

**F2625. COMPASS**, Sight, watch case form, 50 mm diameter, with raised dial and full circle divisions. Bar needle, 30 mm long, with agate cap. Sights and spring cover..... 9.50

**13190. COMPASS**, Surveying, Brunton Patented Pocket Transit, for surface and underground surveying in mining and geological work. Case is of aluminum  $2\frac{1}{4} \times 2\frac{3}{4} \times 1$  inch. Weight, 8 ounces .....

**13202. LEVEL**, Hand, Reflecting, for measuring slopes and gentle elevations. Consists of a square bronzed tube with level, cross-hair, and fixed eye-piece; length, 5 inches; weight,  $2\frac{1}{2}$  ounces .....

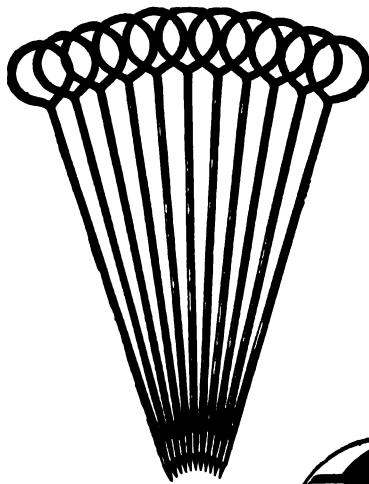


13206. **LEVEL, Simple Form**, consisting of a metal level, a pair of level sights and a stand for supporting the level upon a flat surface or on the end of a stake or crow bar. By its use one can readily determine levels from a given point to one at a distance, such as locating or setting the profiles for foundation work, ascertaining the proper grades for drains, ditches, etc. All parts of the stand are of metal, nickel-plated and japanned, and provided with a  $3\frac{1}{2}$  inch horizontal spirit level and two  $1\frac{1}{2}$  inch vertical spirit levels. The sights are adjustable and clamp to the top of the level by set screws. One sight is provided with a peep hole and the other with a horizontal cross wire. Complete as described, without stake or support ..... \$5.00

13208. **LEVEL, Bostrom's Improved**, provided with telescope which has a magnifying power of eight diameters which enables the cross on the target to be read at a distance of one-quarter of a mile in any direction. A circle graduated in degrees is provided for obtaining angles, squaring up buildings, and all such work. Included in the outfit is a sliding target rod, graduated in feet, inches, and quarter inches, telescoping to five feet when closed and to nine and one-half feet when extended, and having a sliding target of the usual form with thumb-screw for securing in any position. The metal parts are of iron and brass, and the wood parts, including the target, are of pine. Complete in neat wood box with tripod, sliding target rod, target and plumb bob..... 20.00

13210. **LEVEL, Bostrom's Improved**, similar to No. 13208, but more substantial and of finer finish. The telescope has a magnifying power of twelve diameters so that the instrument has a much greater range. All wood parts are of hardwood and all metal parts of brass except the target. Complete in neat wood box with tripod, sliding target rod, target and plumb bob 30.00

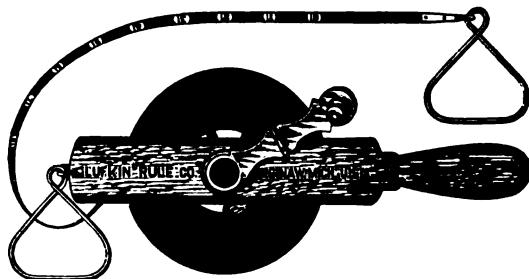
13216. **QUADRANT**, for measuring altitudes. A sector 6 inches in diameter, graduated from  $0^{\circ}$ - $90^{\circ}$  in single degree divisions, mounted on polished wood base, with indicator and sight attachment. A level is mounted on the base so that it may be adjusted to a true horizontal position ..... 5.00



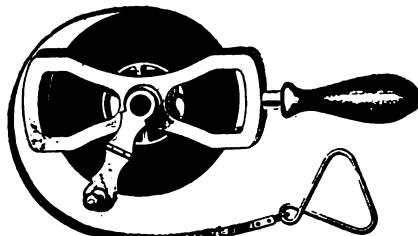
No. 13220.



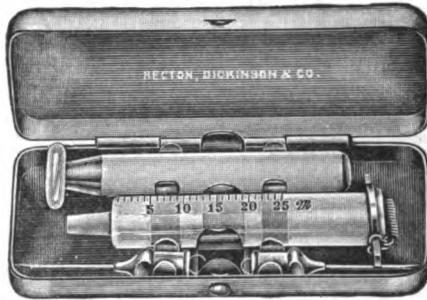
No. 13232.



No. 13224.



No. 13226.



Nos. 13242-3.

13220. **SURVEYORS' ARROWS**, made of  $\frac{3}{64}$  inch round steel fourteen inches long, and with rings enameled in bright vermillion..... per set of eleven \$1.50

13224. **TAPES**, Surveyors' Chain. Heavy  $\frac{1}{4}$  inch steel tape; nicely finished hardwood reel, with metal folding handle and two large and strong detachable rings. Trimmings nicely nickel-plated. Graduated in feet, with end feet in tenths; or in links, with end links in tenths, graduations etched on.

Length, feet.....	100	200	300	links	100	200	300
Each .....	10.00	15.00	24.40		8.50	12.00	15.40

13226. **TAPES**, Surveyors' Chain, graduated on Babbitt Metal. This tape will answer the requirements of the most severe usage and take the place of the old-time steel chain. It is made of practically unbreakable steel, heavily coated with white metal to prevent rusting and corrosion, and somewhat heavier than the ordinary chain tape. The graduations are stamped into Babbitt Metal at each foot (end feet in tenths), or at each link (end links in tenths), so that the graduations can readily be felt as the tape is allowed to pass through the hand. Each tape is provided with a pair of detachable handles, and the reel, which is built especially for such tapes, has a nickel-plated frame with folding winding handles, is easily wound and of beautiful finish.

Length, feet .....	100	200	300	links	100	200	300
Each .....	10.00	18.40	24.20		8.50	13.50	17.00

**TRANSIT, Pocket**, see No. 13190.

13232. **SWIMMING CUPS**, Porcelain, with perforations, for soaking seeds previous to germination. With cork stopper which floats the cup in the water.

No. ....			A	B
Diameter, mm .....			27	35
Height, mm .....			35	50
Each .....			.50	.65

### SYRINGES, ALL KINDS

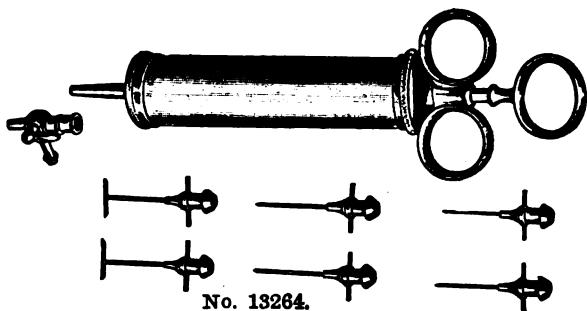
**SYRINGES**, Hypodermic, Luer, all glass, entirely aseptic, without packing, threads or washers. Easily sterilized. With slip-on needles.

Capacity, cc .....	1	2	5	10	20	30
Graduated in, cc.....	$\frac{1}{100}$	$\frac{1}{10}$	$\frac{1}{6}$	$\frac{1}{6}$	1	1

13240.	Syringe only, without needles.....	1.75	1.25	2.25	3.00	4.00	5.00
13241.	Syringe in pasteboard box, with two steel needles .....	2.25	1.50	2.75	3.50	4.50	6.00
13242.	Syringe in nickel-plated case, with two steel needles .....	3.00	2.15	4.00	4.50	6.25	7.75
13243.	Syringe in nickel-plated case, with two platinum-iridium needles .....	4.75	4.50	9.50	10.50	13.50	15.00



No. 13260.



No. 13264.



No. 13306.



No. 13312.

## 13248. NEEDLES, Hypodermic, steel, slip-on type, for Luer Syringes.

No. ....	A	B	C	D	E	F	G	H	J	K
Gage .....	26	26	24	24	24	22	22	20	20	18
Length, inches .....	5/8	3/4	3/4	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	2
Per dozen .....	\$1.50	1.50	1.50	1.50	2.00	2.25	2.25	2.25	2.25	3.00

Note:—Other needles not regularly carried in stock will be furnished upon short notice.

13260. SYRINGE, Aspirating, with piston graduated to 1/4 dram, glass barrel with nickel-plated metal trimmings, finger rings, 3 aspirator needles (1 each 15 gage 3 inch, 17 gage 2 1/2 inch and 19 gage 1 1/2 inch), one 3 inch trocar and canula, and nickel-plated stop-cock. Capacity, 2 drams. Complete in nickel-plated case..... 4.50

13264. SYRINGE, Injecting, of brass, nickel-plated; capacity, 45 cc. For use in injecting reagents and masses into different blood vessels. With two-way stop-cock, four straight canulae of different calibers, and two T canulae for injecting in both directions. Ends of canulae are grooved to prevent them from slipping out of vessels, and projections run out from base of canulae to fasten threads to. Complete as described, in wooden case with six canulae and stop-cock 9.00

13306. TAPE, Transparent Adhesive, for mending pages of books, drawings, papers, maps, etc., 5/8 inch wide; 4 yards on spool with metal holder..... per spool .08

1536. TAPE, Gummed Cloth, heavy mending tape for strengthening books, pamphlets, maps, etc., 3/4 inch wide. A 10 yard roll in special box with slot for drawing out as needed....per roll .45

13310. TAPES, MEASURING, Linen, English. Patent leather case, waterproof coated, with brass folding handle and trimmings. Tape 1/2 inch wide, graduated in 1/4 inches.

Length, feet .....	40	100
Each .....	1.40	2.80

13312. TAPES, MEASURING, Linen, Metric. Brass bound case and folding handle. Tape 13 mm wide, graduated in centimeters.

Length, meters .....	10	25
Each .....	.75	1.60

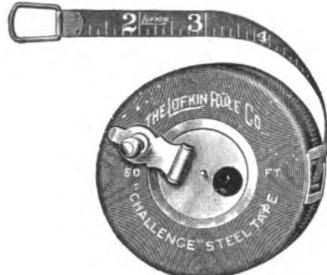
13314. TAPES, MEASURING, Linen, English and Metric. Nickel-plated brass case with spring wind and center stop. Tape 1/4 inch wide, graduated in millimeters and 1/8 inches.

Length, meters .....	1	2
Each .....	.65	1.10

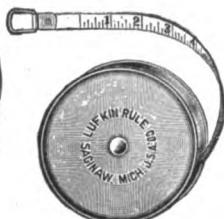
13318. TAPES, MEASURING, Metallic, English and Surveyors'. Hard leather case, folding handle, nickel-plated trimmings. Tape 5/8 inch wide, made of best woven linen with metallic warp, graduated on one side in tenths of feet and on the other side in links.

Length, feet .....	50	100
Each .....	5.50	8.90

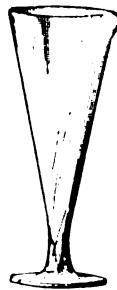
See Note on Nos. 13318-20.



No. 13320.



No. 13324.



No. 13332.



No. 13346. No. 13350.



No. 13352. No. 13354.

13320. **TAPES, MEASURING, Steel, English.** Metal lined hard leather case, nickel-plated trimmings, folding winding handle opened by pressing pin on opposite side. Tape  $\frac{3}{8}$  inch wide, graduated in feet, tenths, and hundredths.

Length, feet .....	50	100
Each .....	\$6.80	11.50

**NOTE:** Nos. 13318-20 Measuring Tapes are provided with a new marking by means of which instantaneous readings of both feet and inches can be made without the necessity of referring back to the last entire foot. The method is well shown in the accompanying illustration.

13324. **TAPES, MEASURING, Steel, English and Metric.** German silver case with spring wind and stop. Tape  $\frac{1}{4}$  inch wide (5 meter,  $\frac{5}{16}$  inch), graduated in millimeters and 16ths of inches.

Length, meters .....	1	2	5
Each .....	1.20	1.70	4.90

13326. **TAPE, Steel, Diameter Measuring,** giving directly the diameter of a circular object when its circumference is measured. In metal lined, hard leather case with nickel-plated trimmings, with folding flush handle opened by pressing upon a pin on opposite side. The tape is of steel  $\frac{3}{8}$  inch in width and 50 feet long, graduated on one side in feet, tenths, and hundredths, and on the other side in diameters (inches and tenths of inches). Fitted with a special peg or spike for fastening to tree or other object to be measured..... 9.20

13332. **TEST GLASSES,** conical form, with lip, for sedimentation.

Capacity, cc.....	30	60	125	175	250
Each .....	.50	.60	.70	.80	1.10

**TEST PAPER, see Paper.**

13346. **TEST TUBES, Thin Wall, ordinary glass, with lip, well annealed, free from lead, for chemical use.**

No. ....	A	B	C	D	E	F	G	H	J	K	L
Length, inches.....	3	4	5	5	6	6	6	7	8	10	12
Diameter, inches.....	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$\frac{7}{8}$	1	1	1
Per dozen .....	.25	.27	.30	.33	.36	.38	.57	.65	.82	1.05	2.05
Per gross .....	1.95	2.15	2.40	2.60	2.85	3.00	4.55	5.30	6.50	8.45	18.25

13350. **TEST TUBES, Thin Wall, ordinary glass, with lip, on foot.**

No. ....	A	B	C	D	E
Length, inches .....	4	5	6	8	10
Diameter, inches .....	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	1
Each .....	.07	.12	.15	.26	.40
Per dozen .....	.65	1.20	1.50	2.60	3.90

13352. **TEST TUBES, Thin Wall, ordinary glass, with lip, with side arm.**

No. ....	A	B	C	D
Length, inches .....	5	6	8	10
Diameter, inches .....	$\frac{5}{8}$	$\frac{3}{4}$	1	1
Each .....	.13	.15	.18	.30
Per dozen .....	1.30	1.50	1.80	3.00

13354. **TEST TUBES, Thin Wall, ordinary glass, with lip, graduated.**

Capacity, cc.....	.5	10	20	25	30
Graduated to, cc.....	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$
Each .....	.27	.33	.50	.53	.60



No. 13358.



No. 13360.



No. 13370.



No. 13382.



No. 13426.

**13358. TEST TUBES, Thick Wall, ordinary glass, without lip, culture tubes for bacteriological work, so-called Board of Health tubes.**

No. ....	A	B	C	D	E
Length, inches.....	3	4	5	6	8
Diameter, inches.....	1/8	1/2	5/8	3/4	1
Per dozen.....	.30	.35	.40	.45	.55
Per gross.....	\$3.00	3.15	3.60	3.90	8.20

**13360. TEST TUBES, Thick Wall, ordinary glass, without lip, flat bottomed, so-called specimen tubes.**

No. ....	A	B	C	D
Length, inches.....	4	5	6	8
Diameter, inches.....	1/2	5/8	3/4	1
Per dozen.....	.35	.40	.45	.90
Per gross.....	3.15	3.60	3.90	8.25

**13370. TEST TUBES, Thick Wall, Pyrex glass, without lip, for combustion and ignition purposes, thickness of wall, about 1 1/2 mm.**

No. ....	A	B	C	D
Length, mm.....	100	125	150	200
Diameter, mm.....	16	16	19	25
Per dozen .....	1.25	1.50	1.80	6.00
Per gross .....	12.50	15.00	18.00	60.00

**13382. TEST TUBES, Potato Culture, ordinary glass, with lip, with constriction and bulb at the bottom. Length, 150 mm; diameter, 18 mm..... per dozen .90**

For TEST TUBE BRUSHES see page 40.

For TEST TUBE HOLDERS see page 53.

## THERMOMETERS, ALL KINDS

**13426. THERMOMETERS, Solid Stem, Engraved Scale, for general use. Diameter of stem, about 1/4 inch. Graduated in 1° divisions.**

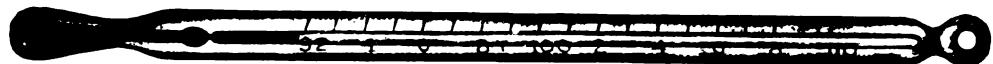
No. ....	A	B	C	D	E	F
Range, degrees C.....	0 to 60	-10 to 110	0 to 150	0 to 200	0 to 250	0 to 350
Length, inches .....	10	12	12	14	14	16
Each .....	1.10	1.20	1.25	1.60	1.80	2.00

**13428. THERMOMETERS, Solid Stem, Engraved Scale, same as No. 13426, but graduated in Fahrenheit scale, in 2° divisions.**

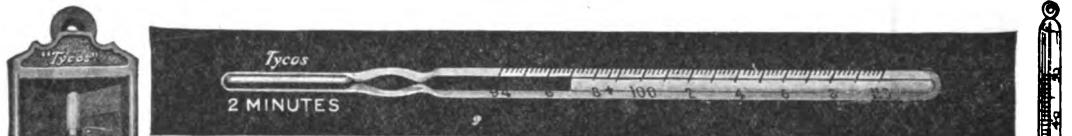
No. ....	A	B	C
Range, degrees F.....	10 to 220	30 to 400	30 to 650
Length, inches .....	12	14	16
Each .....	1.20	1.60	1.80

**13430. THERMOMETERS, Solid Stem, Engraved Scale, same as No. 13426, but with double scale.**

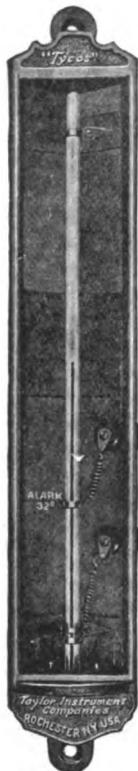
No. ....	A	B	C
Range, degrees C.....	-10 to 110	0 to 200	0 to 350
Range, degrees F.....	10 to 220	30 to 400	30 to 650
Each .....	1.80	2.40	3.00



No. 13548.



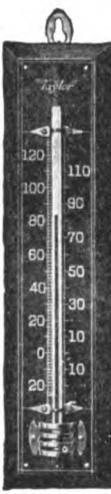
No. 13546.



No. 13508.



No. 13562.



No. 13564.



No. 13568.

13508. **THERMOMETER, Automatic Alarm**, for giving an alarm the instant the temperature registers a given degree. Consists of a straight mercury tube, into the bore of which a fine platinum wire is fused at 32° F., or at any other degree desired. Through a non-sparking relay attachment a bell is made to ring at practically any distance from the thermometer itself, at the exact moment the temperature where the instrument is located reaches the danger point. Strongly constructed and fully protected by a heavy metal weather-proof case, which allows circulation of air. May be installed in three different ways: (1) one thermometer and simple alarm; (2) more than one thermometer and simple alarm; (3) more than one thermometer and annunciator alarm showing exact location of danger point. In ordering, kindly state the temperature at which alarm is to be given. Complete with relay, but without batteries, bell, or wire .....

13510. **THERMOMETER, Automatic Alarm**, similar to No. 13508, but arranged to ring at either of two temperatures desired, which must be specified when ordering. Complete with relay, but without batteries, bell, or wire..... 33.00

13546. **THERMOMETER, Clinical, One Minute**, first grade, with magnifying tube, in hard rubber case, with factory certificate ..... 1.75

13548. **THERMOMETER, Clinical, Veterinary**, first grade, pear-shaped bulb, ring top, with magnifying tube, in hard rubber case, with factory certificate ..... 1.75

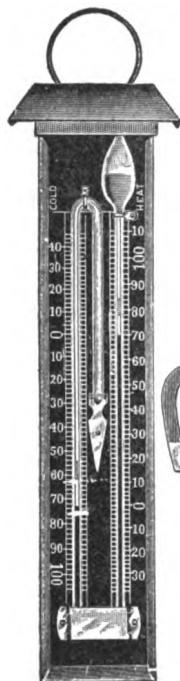
**THERMOMETERS, Dairy**, see Milk Testing Apparatus.

13562. **THERMOMETER, Household**, standard grade, 10 inch, heavy japanned tin case, accurately tested. Approximate range,—20° to 120°F..... 1.50

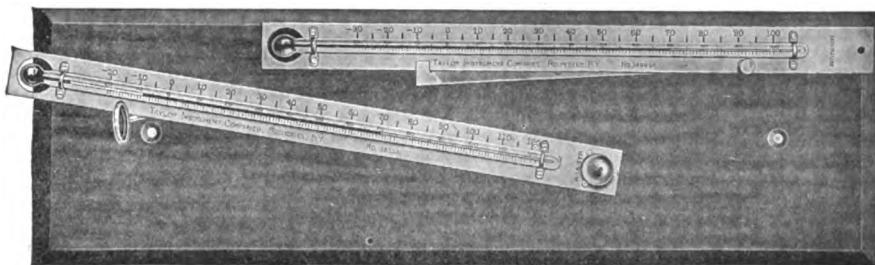
13564. **THERMOMETER, Household**, 8 inch, metal scale, oak back, beveled edge, with brass guard over bulb. Approximate range,—20° to 120°F..... 1.00

13568. **THERMOMETER, Incubator, Solid Stem, Engraved Scale**, with enlargement in stem to prevent slipping through hole in stopper. Length, about 20 cm. Range, 0° to 50° C., in 1° divisions .....

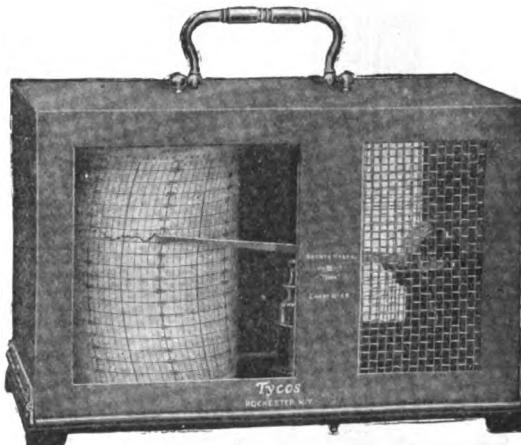
3.50



No. 13584.

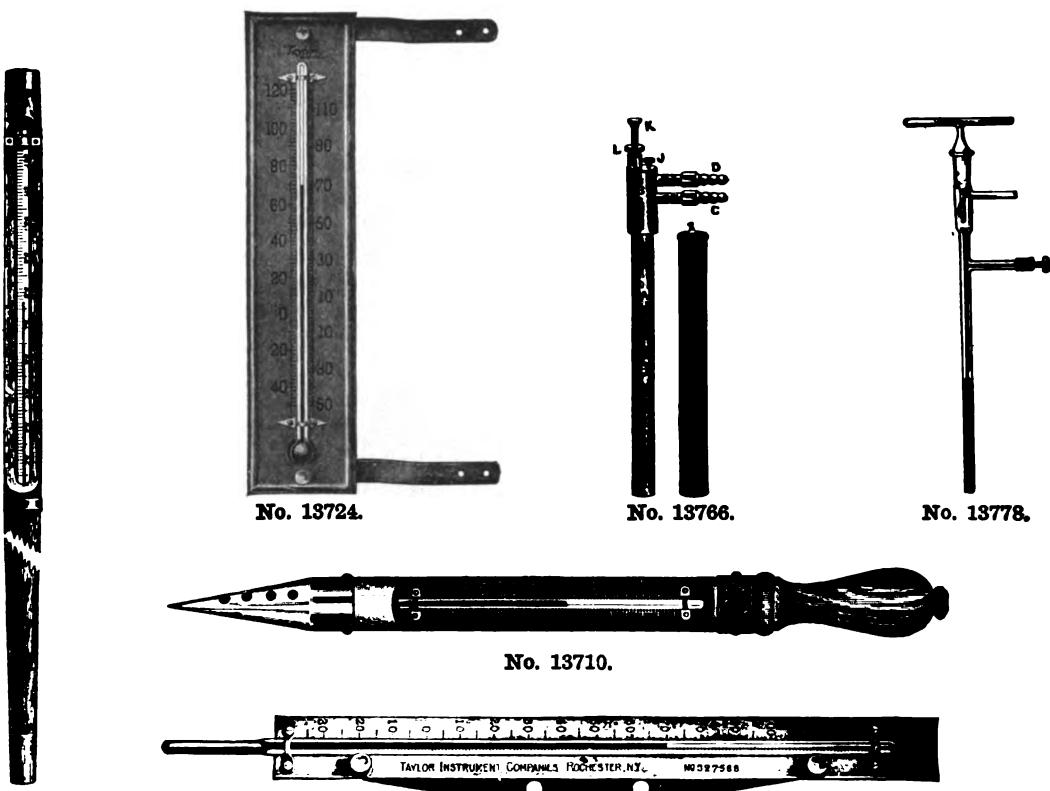


No. 13578.



Nos. 13676-80.

13572. THERMOMETER, Maximum Registering, U. S. Weather Bureau Pattern, 12 inch, cylindrical bulb, graduation etched on tube. The tube is mounted on an aluminum scale on which is marked every 5 degree line of the scale, and the figures every 10 degrees. Has brass insulating support and binding screws. Approximate range, -30° to 120° F. With manufacturer's certificate .....	\$7.20
13574. THERMOMETER, Minimum Registering, U. S. Weather Bureau Pattern. Same general description as No. 13572. Mercury filled tube. With manufacturer's certificate.....	6.60
13578 THERMOMETERS, Maximum and Minimum Registering, U. S. Weather Bureau Pattern. Same thermometers as Nos. 13572 and 13574, but with special insulating support. Mounted on mahogany finish back, 17x5 inches, with manufacturer's certificate for each thermometer. ....	Per set 14.40
13579. THERMOMETER, Maximum, only for No. 13578. With manufacturer's certificate.....	7.20
13580. THERMOMETER, Minimum, only for No. 13578. With manufacturer's certificate.....	6.60
13584. THERMOMETER, Maximum and Minimum Registering, Six's Pattern, in japanned tin case with metal scale. Length, 8 inches; approximate range, -20° to 120°F. Complete with horseshoe magnet for resetting.....	5.50
13676. THERMOMETER, Recording (Thermograph). Made in America. A most accurate thermometer which will not vary its standard for years. A complete record is given by a pen upon a printed chart for an entire week, and by its form the exact thermometric reading can be seen at any moment, as well as the varying line traced by the pen for the time preceding. The charts are changed at the beginning of each week and can be retained as a record for the entire year. Mechanism consists of a spiral lamina of non-rusting material, which is exposed to the atmosphere at the end of the case. It is extremely sensitive and, having no levers in its construction, is very rigid. In non-corrosive metal case with glass front and screened openings on three sides about the lamina, and with storage space for charts. Range, 0° to 100° F. in 2° divisions. May ordinarily be used for any range of 100° F. between -20° and + 250° by means of No. 13683 Unfigured Charts. Complete with full directions for use, charts for one year, pen and ink.....	50.00
13678. THERMOMETER, Recording (Thermograph). Same as No. 13676, but with charts from 20° to 120°F .....	50.00
13680. THERMOMETER, Recording (Thermograph). Same as No. 13676, but with unfigured charts for a range of 100°F. in 2° divisions.....	50.00
13681. THERMOGRAPH CHARTS, 0° to 100°F., for use with No. 13676. In boxes containing a year's supply .....	Per box 2.00



No. 13712.

No. 13720.

13682. **THERMOGRAPH CHARTS**, 20° to 120°F., for use with No. 13678. In boxes containing a year's supply ..... **Per box \$2.00**

13683. **THERMOGRAPH CHARTS**, Unfigured, for use with No. 13680. Range, 100°F. in 2° divisions. In boxes containing a year's supply ..... **Per box 2.00**

13689. **THERMOGRAPH CHARTS**, for use with old style imported high drum thermographs. Style No. 46. Range -62° to +128°F. In boxes containing a year's supply ..... **Per box 2.25**

13691. **THERMOGRAPH CHARTS**, for use with old style imported low drum thermographs. Style No. 37. Range 0° to 100°F. In boxes containing a year's supply ..... **Per box 2.50**

13710.  **THERMOMETER**, Soil, Standard Grade, magnifying tube, mercury-filled, mounted on 15 inch turned mahogany frame with oxidized brass scale, and with pointed metal end. Range, -30° to 180°F. .... **2.50**

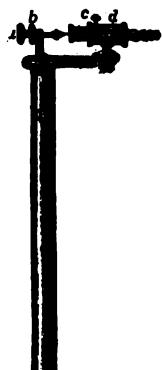
13712.  **THERMOMETERS**, Soil, as used by the New York Agricultural Experiment Station. With solid stem engraved scale thermometer mounted in turned wood case with upper part cut away to expose 10 inches of the scale from about 20° to 120° F. Both ends are protected by metal ferrules.  
 No. ..... A B C  
 For use at depth, inches ..... 12 24 36  
 Each ..... 9.25 10.25 13.50

13720.  **THERMOMETER**, Weather Bureau Standard, 12 inch, cylindrical bulb, graduation etched on tube. The tube is mounted on an aluminum scale on which is marked every 5 degree line of the scale, and the figures every 10 degrees. Has brass insulating support and binding screws. Approximate range, -30° to 120°F. With manufacturer's certificate ..... **6.00**

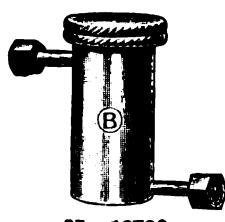
13724.  **THERMOMETER**, Window, for weather observations, with magnifying tube, alcohol filled, mounted on nickel-plated metal back, with brackets for attachment to window frame. Length, 10 inches; approximate range, -40° to 120°F. .... **1.50**

13766.  **THERMO-REGULATOR**, Gas, Greenman Mercury, constructed entirely of steel, widely used in connection with Greenman Burner No. 2102 for heating and regulation of incubators. A brass jacket is supplied for the thermo-regulator which is to be filled with glycerine. Length of thermo-regulator tube, 10 inches; diameter of outer jacket, 1 inch. With inlet and outlet tubes threaded with  $\frac{1}{8}$  inch iron pipe thread for permanent connection with gas supply. Without mercury ..... **16.50**

13778.  **THERMO-REGULATOR**, Gas, Reichert's, of glass with brass adjusting screw. Length, 9 $\frac{1}{2}$  inches ..... **4.80**



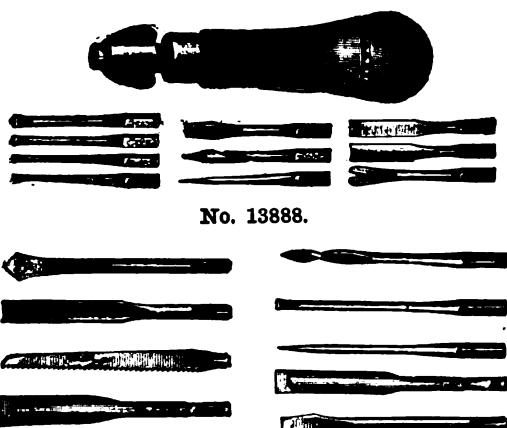
No. 13784.



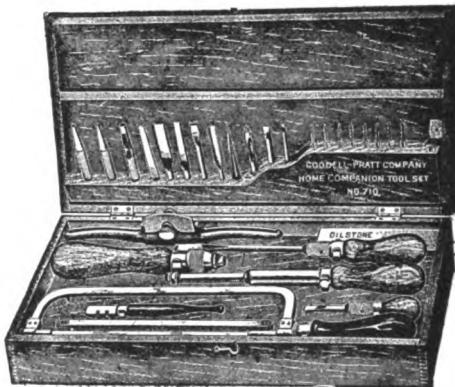
No. 13786.



Nos. 13824-32.



No. 13888.



No. 13894.

**13784. THERMO-REGULATORS, Gas, Roux Bimetallic, operating without the use of mercury or glass.**

Diameter of tube, 1 inch.

Length, inches .....	10	12
Each .....	\$12.50	13.00

**13786. GAS FILTER ATTACHMENT,** for use with Nos. 13766 and 13784, for cleaning the illuminating gas of coal tar and other impurities..... 7.00

**13824. TONGS, Crucible, Double Bent, brass,** with riveted joint. Length, 9 inches..... .45

**13826. TONGS, Crucible, Double Bent, brass, nickel-plated,** with riveted joint. Length, 9 inches. .60

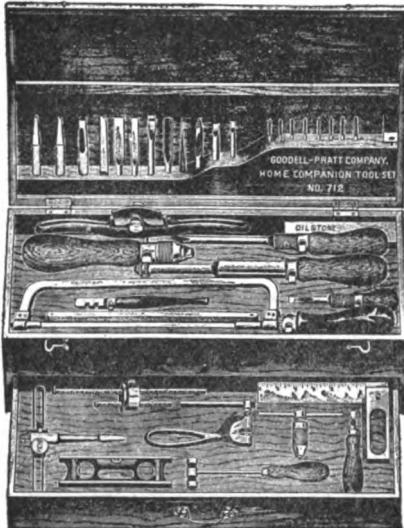
**13830. TONGS, Crucible, Double Bent, steel,** with riveted joint. Length, 9 inches..... .25

**13832. TONGS, Crucible, Double Bent, steel, nickel-plated,** with riveted joint. Length, 9 inches. .40

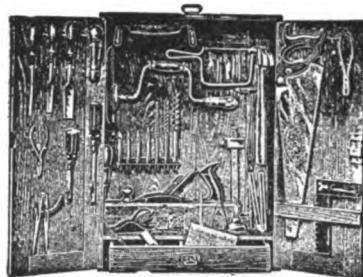
**13888. TOOL HOLDER,** with hollow wood handle and ten enclosed tools. Length of holder over all, 6 inches. Length of tools, 2½ inches..... .90

**13890. TOOL HOLDER.** Handle similar to that of No. 13888, but larger and better finished. Has 9 tools, as shown in the illustration. Length of handle over all, 7 inches. Length of tools, 3¾ inches ..... 2.00

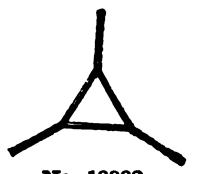
**13894. TOOL SET in Case** of polished hardwood, 16x8½x3½ inches, containing 6-in. and 1½-in. ratchet screw drivers, hand shave, hack saw frame with 11 blades and one bone saw, glass cutter, wood handle automatic drill, tool handle with 9 tools, nail set, prick punch, saddlers' drive punch, solid punch, and oil stone..... 11.00



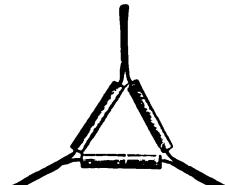
No. 13896.



No. 13900.



No. 13932.



No. 13934.



No. 13956.



No. 13958.



No. 13960.

13896. **TOOL SET** in Case of polished hardwood,  $16 \times 8\frac{1}{2} \times 5\frac{1}{2}$  inches, containing 6-in. steel try square, 6-in. iron level, double beam roller gauge, washer cutter, gunsmiths' screw driver, tool holder for small square shank tools, brass hammer, lever metal punch, 6-in. and  $1\frac{1}{2}$ -in. ratchet screw drivers, hand shave, hack saw frame with 11 blades and one bone saw, glass cutter, wood handle automatic drill, tool handle with 9 tools, nail set, prick punch, saddlers' drive punch, solid punch, and oil stone..... \$25.00

13900. **TOOL SET** in Chest of chestnut, panelled and nicely finished. Contains the following high grade tools.

Panel saw, brace, 3 gimlet bits, 3 auger bits, 3 chisels, 2 screw drivers, hack saw frame, pocket level, countersink, scraper, hammer, tack hammer, tool handle with 10 tools, spoke shave, block plane, jack plane, 2-foot rule, try square, marking gage, nail sets, wing dividers, gas pliers, flat nose pliers, nippers, saw file, oil stone, oil can, can of glue, and coping saw. Weight, 55 lbs. .... 27.00

**TOOLS, Miscellaneous**, see various headings, as **Calipers, Pliers, Hammers, etc.**

13906. **TOWELLING**, Crash, good quality, 16 to 17 inches wide, in bolts of 50 yards.... **Per yard** .30  
**Per bolt** 12.50

13932. **TRIANGLES**, iron wire, twisted.

No.	A	B	C
Length of side, inches.....	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Each .....	.06	.06	.06
Per dozen .....	.50	.55	.60

13934. **TRIANGLES**, iron wire covered with pipe stems.

No.	A	B	C	D
Length of side, inside, inches.....	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Each .....	.09	.09	.10	.11
Per dozen .....	.80	.90	1.00	1.10

13956. **TRIPODS**, iron, small, for alcohol lamps. Height, 6 inches; diameter,  $3\frac{1}{4}$  inches..... .45

13958. **TRIPODS**, iron, japanned, with easily removable legs and wide rim. Height, 9 inches.

Diameter, outside, inches.....	5	6	8	10	12
Each .....	.30	.35	.55	.70	.80

13960. **TRIPODS**, iron, japanned, same as No. 13958, with concentric rings.

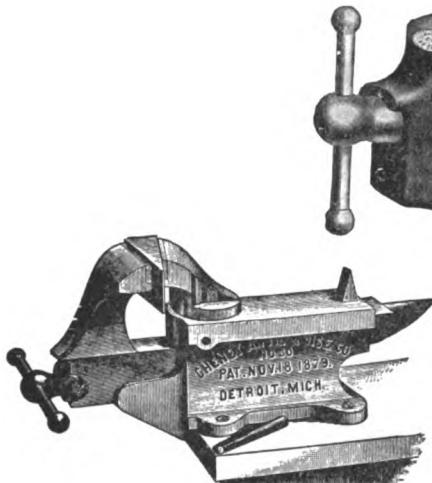
No.	A	B	C	D	E
Diameter, outside, inches.....	5	6	8	10	12
Number of rings.....	2	3	4	5	6



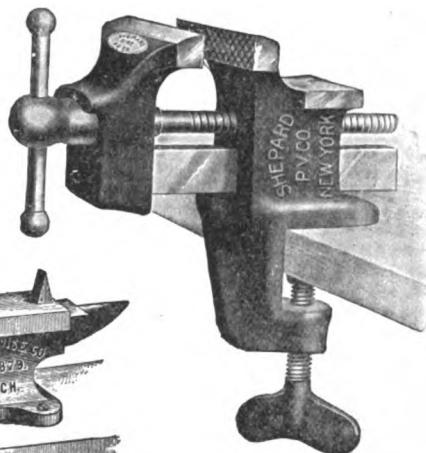
No. 13990.



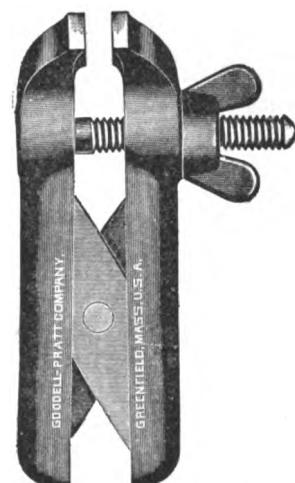
No. 13992.



No. 14188.



No. 14192.



No. 14196.

13988. **TROWEL**, with 6 inch cold rolled curved steel blade, with malleable iron shank firmly riveted on and wood handle..... \$0.20

13990. **TROWEL**, best quality, with 6 inch curved blade made of one solid piece of steel, with wood handle. Will outwear all others..... .80

13992. **TROWEL, Transplanting or Collecting**, with narrow and deeply curved blade 6 inches long, and wood handle. Useful with the collecting case or as a transplanter, dibber, or weed digger .20

F3355. **TUMBLERS, Glass, Heavy**, capacity, about 250 cc; diameter at top, 60 to 65 mm. each .07  
per dozen .70

14038. **TWINE, Cotton**, 3-ply..... Per ball .20

14040. **TWINE, Linen**, No. 9, white..... Per ball .80

14188. **VISES, Anvil**, adjustable jaws, strongly constructed. Base is drilled to fasten rigidly to bench by screws.

No. ....	A	B	C
Width of opening, inches.....	3	4	5
Width of jaw, inches.....	2½	3½	4
Weight, pounds .....	9	25	35
Each .....	7.50	9.25	12.00

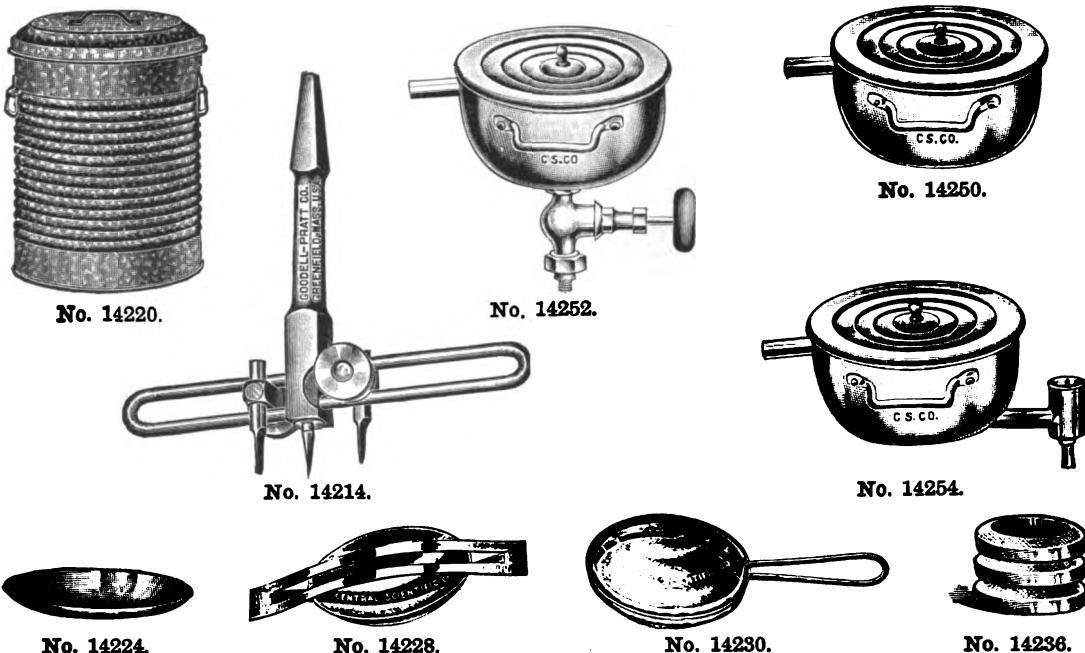
14190. **VISES, Anvil with Clamp**. Provided also with a steel base drilled to fasten rigidly to bench by screws.

No. ....	A	B
Width of opening, inches.....	2½	3½
Width of jaw, inches.....	2¼	2¾
Weight, pounds .....	5½	9
Each .....	3.20	4.60

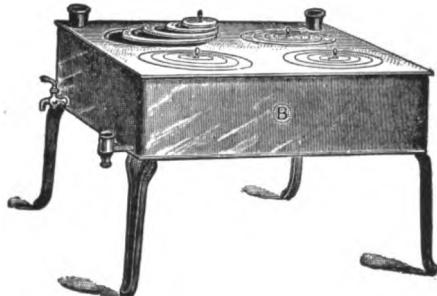
14192. **VISES, Anvil with Clamp, Small**. Very convenient for laboratory use.

No. ....	A	B
Width of opening, inches.....	1½	1¾
Width of jaw, inches.....	1½	2
Weight, pounds .....	1½	2½
Each .....	1.20	1.80

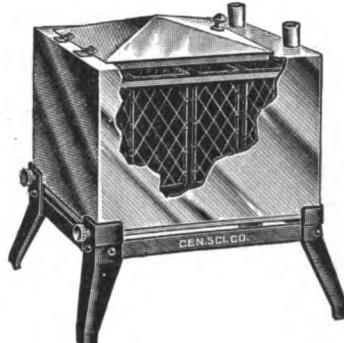
14196. **VISE, Hand**, with parallel jaws. Very convenient and useful. Made from drop forgings, with the faces of the jaws scored and case hardened. The faces of the jaws are 1¾ inches long, ¾ inch wide; jaws open 1¾ inches; whole tool 4½ inches long. Black finish..... 3.00



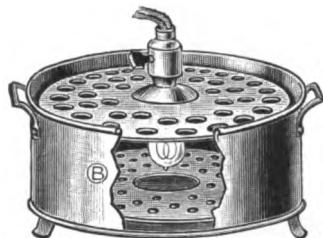
14214. <b>WASHER CUTTER.</b> A strong, well made, useful device for cutting washers of diameter from $\frac{1}{2}$ in. to $5\frac{1}{2}$ in. Provided with removable blade adjustable as to length of cutting edge as well as position. These blades can easily be removed for sharpening or replaced when they wear out. Nicely polished and attractive in appearance .....	\$2.25
14220. <b>WASTE CAN,</b> Galvanized, $14 \times 14\frac{1}{4}$ inches; capacity, $9\frac{1}{4}$ gallons; with seamless cover fitting over outside .....	3.00
<b>WASTE JARS</b> , see Jars.	
<b>WASTE PAIL</b> , see Pails.	
14224. <b>WATCH GLASSES</b> , well annealed, with edges smoothly ground.	
Diameter, inches... $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4 $4\frac{1}{2}$ 5     6     7     8	
Per dozen.....     .40     .50     .60     .70     .90     1.00     1.20     1.30     1.60     2.10     2.50	
14226. <b>WATCH GLASSES</b> , in Pairs, with edges ground to fit accurately together, for use with Clamps Nos. 2902-4.	
Diameter, inches .....	2
Per pair .....	.30
14228. <b>WATCH GLASSES</b> , in Pairs, same as No. 14226, with Clamp No. 2902.	
Diameter, inches .....	2
Per pair with clamp .....	.40
14230. <b>WATCH GLASSES</b> , in Pairs, same as No. 14226, with Clamp No. 2904.	
Diameter, inches .....	2
Per pair with clamp .....	.40
<b>WATCH GLASS CLAMPS</b> , see Clamps.	
824. <b>WATCH GLASSES</b> , Counterpoised, for use on balance pans.	
Diameter, mm.....     50     62     75	
Per pair .....	1.20     1.30     1.40
<b>WATCH GLASSES</b> , Embryological, see Dishes, Staining.	
14236. <b>WATCH GLASSES</b> , Syracuse, plain; outside diameter 65 mm; inside diameter, 50 mm. Grooved to facilitate stacking .....	Per dozen .70
14238. <b>WATCH GLASSES</b> , Syracuse, same as No. 14236, with beveled surface ground for writing .....	Per dozen 1.00
14250. <b>WATER BATHS</b> , polished copper, tin lined, with concentric copper rings and cover, handles and steam escape.	
Diameter, inches .....	4     5     6     8     10
Number of rings.....	3     4     5     6     8
Each .....	1.50     1.80     2.40     3.75     7.50
14252. <b>WATER BATHS</b> , for Steam Heat, same as No. 14250 with steam valve and waste pipe.	
Diameter, inches .....	6     8     10
Each .....	7.00     8.00     11.50
14254. <b>WATER BATHS</b> , polished copper, same as No. 14250, with constant water level.	
Diameter, inches .....	4     5     6     8     10
Number of rings.....	3     4     5     6     8
Each .....	3.00     3.25     4.00     5.25     9.00



No. 14272.



No. 14288.



No. 14340.



No. 14522.

14272. **WATER BATH**, rectangular form, with 4 openings 5 inches in diameter, with concentric rings and cover, stop-cock for draining, constant water level regulator, tubulations for thermometer and thermo-regulator, and an extra sheet iron bottom, mounted on heavy iron support. Dimensions, 14 inches square by 5 inches deep..... \$21.00

14274. **WATER BATH**, same as No. 14272, but with coil for steam heat..... 27.50

14276. **WATER BATH**, of similar construction to No. 14272, but with 7 openings, 3 of 6 inches diameter, and 4 of 4 inches. Dimensions, 23 x 13½ x 5 inches deep..... 30.00

14278. **WATER BATH**, same as No. 14276, but with coil for steam heat..... 37.50

14288. **WATER BATH**, Agar Melting, gas heated, for keeping agar liquefied for inoculation previous to pouring into Petri dishes. Made of heavy copper tinned inside, with lid which slopes from the center to all four sides preventing moisture from dripping into the tubes. Troughs are arranged along the sides to carry off the condensed moisture. Provided with tubulations for thermometer and thermo-regulator. Complete with six tinned wire test tube baskets, 3¼ x 3¾ x 6 inches, and with cast iron support stand 8¼ inches high. Height over all, 18 inches; length, 11½ inches; width, 7¾ inches. Without burner ..... 40.00

14340. **WATER BATH**, Whipple's, for melting gelatine. Of heavy copper, tinned inside, with rack to hold 48 test tubes up to ¾ inch in diameter. An incandescent lamp may be used to heat the bath to the required temperature. Diameter of bath, 12 inches; depth, 5 inches. Without lamp, lamp socket or cord..... 17.50

14512. **WIRE GAUZE**, Brass, 20 mesh, in squares for use under dishes, beakers, etc.

No.	A	B	C	F
Size, inches	4x4	5x5	6x6	12x12
Each	.12	.18	.24	.95
Per dozen	1.20	1.80	2.40	9.60

14520. **WIRE GAUZE**, Iron, 20 mesh, in squares for use under dishes, beakers, etc.

No.	A	B	C	F
Size, inches	4x4	5x5	6x6	12x12
Each	.05	.06	.10	.32
Per dozen	.50	.60	1.00	3.20

14522. **WIRE GAUZE**, Tinned Iron, with flat asbestos center 3½ inches in diameter, in squares for use under dishes, beakers, etc. No.....

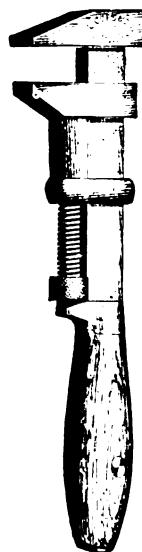
Size, inches	A	B	C
Each	.12	.14	.18
Per dozen	1.20	1.40	1.80



No. 14534.



No. 14542.



No. 14544.



No. 14546.



No. 14548.

14534. **WORK BENCH.** This bench is 50 inches long, exclusive of tail vise, or 56 inches over all. It is 32 inches high and 20 inches wide, with a 13 inch glued up maple top  $1\frac{1}{4}$  inches thick and a 7 inch well for tools. It has holes for stops, and three spring wood stops are supplied. It is fitted with both front and tail vises, each having  $1\frac{1}{2}$ -inch patent saw-cut threaded bench screws. Bench is fitted with both back board and tool rack, as shown in illustration. Weight packed for shipment, 120 pounds. **F. O. B. Factory** ..... \$20.00

14542. **WRENCH, Fruit Jar**, for unscrewing the caps of Mason fruit jars. The most obstinate cases of tightly screwed caps yield to its use. It is also valuable for screwing on the caps to make them air-tight ..... .15

14544. **WRENCHES, Monkey**, good quality.  
Length, inches ..... 6 8  
Each ..... .80 1.00

14546. **WRENCH, Monkey, Pocket.**  $5\frac{1}{2}$  inches long ..... .30

14548. **WRENCH, Stillson's Pipe.** 10 inches long, will take pipe from  $\frac{1}{8}$  inch to 1 inch..... 1.60

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